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KEILANIEMI TUNNEL AND TOWERS PLANNING CASE. A PERSPECTIVE OF ADAPTATIONS, SYSTEMS ANALYSIS AND PATH DEPENDENCE

Master's Thesis
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Abstract

The thesis explores the planning process for a large-scale land use and transportation development project in Keilaniemi, in Espoo, Finland. The aim is to tunnelize a regional circular road, Ring Road I in the area, and to build four high-rise residential towers on the side of the tunnel. The broader objective is to bridge the barrier of Ring Road I between three neighbourhoods of Otaniemi, Tapiola and Keilaniemi, and to strengthen the area in Espoo dedicated to business and innovation.

A concept of systems analysis is used in the work to analyse the creation of alternatives in the initial stages of the project. Systems analysis provides a structure to develop, compare and choose among planning alternatives in cooperation between stakeholders. Adaptive capacity assesses the ability of the planning organization in making incremental or radical adaptations during the process. Path dependence is used as a conceptual tool to explain holding on to an early solution even in the face of adversities during planning.

The study first explores the planning process by means of planning documents and the Espoo representative bodies' meeting minutes. The planning assumed the alternative to build Ring Road I into a tunnel from its beginning, to reduce the harmful effects of traffic for the living environment. The primality in planning has shifted during planning from the adjoining area of Hagalund to Keilaniemi, to reflect oncoming metro extension and strategic considerations. Expert interviews among the key stakeholders have been used to explore the central matters within the Keilaniemi planning case. The expert interviews brought forth several areas of relevance, for example the investor-led nature of planning in Espoo, the expensiveness of a deck cover solution and the differences in opinion between the state and local planners regarding specific planning issues.

The biggest obstacle for the Keilaniemi tunnel and towers plan has been the cost of the scheme. Espoo City Council required that the expenses should be covered with the land sale revenues. Over the course of planning many incremental adaptations to the plan have been made, to cut the costs and mitigate the incurring risks. There has been made a suggestion of an alternative to turn Ring Road I into a city street and build on its side. In a later stage of planning the Espoo City Council required estimations of the costs and amounts of building rights of this alternative, which ultimately were not made. The interviewed experts were asked about this kind of boulevard alternative, and here it has been addressed relying on the studies made for the new City of Helsinki master plan.

Keywords Keilaniemi, tunnel, towers, systems analysis, adaptive capacity, path dependence, city boulevard

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Tiivistelmä

Opinnäyte käsittelee suuren mittakaavan maankäyttö- ja liikennehankkeen suunnitteluprosessia Keilaniemessä Espoossa. Hankkeen tavoitteena on tunneloida alueella seudullinen kehätie Kehä I ja rakentaa neljä asuintornitaloa tunnelin viereen. Laajempi tavoite on poistaa Kehä I:n estevaikutusta kolmen alueen, Otaniemen, Tapiolan ja Keilaniemen, välillä, ja vahvistaa tätä yrittämiselle ja innovaatiolle suunnattua aluetta Espoossa.

Järjestelmien analyysin käsitettä käytetään tässä työssä analysoitaessa hankkeen alkuvaiheen vaihtoehtojen luomista. Järjestelmien analyysi tarjoaa rakenteen, jolla voidaan kehittää ja vertailla suunnitteluvaihtoehtoja osallistahojen kesken ja valita vaihtoehtojen väliltä. Muutoskapasiteetilla arvioidaan suunnitteluorganisaation kykyä tehdä vähittäisiä tai radikaaleja muutoksia suunnitteluratkaisuun. Polkuriippuvuutta käsitteenä käytetään hyödyksi selittämään sitä, miksi varhain valitussa vaihtoehdossa pitäydytään myös kohdattaessa vaikeuksia suunnittelun kuluessa.

Tutkimuksessa tarkastellaan ensin suunnitteluprosessin kulkua suunnitteludokumenttien ja Espoon valtuuston, kaupunginhallituksen ja kaupunkisuunnittelulautakunnan pöytäkirjojen pohjalta. Kehä I:n tunnelointi valittiin alusta pitäen vaihtoehdoksi, jolla ehkäistään liikenteen asumiselle aiheuttamia haittoja. Suunnittelun ensisijaisuus siirtyi prosessin kuluessa viereiseltä Hagalundin alueelta Keilaniemeen otettaessa huomioon metron jatke Espoossa ja strategiset arviot. Keskeisten osallisten tahojen asiantuntijoiden kanssa tehtyjä haastatteluja käytetään arvioitaessa Keilaniemen suunnittelutapauksen keskeisiä piirteitä. Asiantuntijahaastattelut toivat esiin useita merkityksellisiä aiheita, kuten Espoon varsin investoijakeskeisen suunnittelukäytännön, kansirakentamisen kalleuden ja tiettyjä näkemyseroja valtion ja kunnallisen tahon välillä suunnittelukysymysten suhteen.

Suurin este Keilaniemen tunneli- ja tornisuunnitelmalle on ollut ratkaisun hinta. Espoon kaupunginvaltuusto edellytti, että rakentamisen kustannukset katetaan tonttien myyntituloilla. Suunnitelmaan on tehty monia vähittäisiä muutoksia kulujen sekä riskien vähentämiseksi. On ehdotettu myös vaihtoehtoa, jossa Kehä I muutetaan Keilaniemessä kaduksi, jonka varteen rakennetaan. Suunnittelun myöhemmässä vaiheessa Espoon kaupunginvaltuusto edellytti tämän vaihtoehdon suhteen kuluista ja rakennusoikeuden määrästä arvioita, joita lopulta ei tehty. Haastatelluilta asiantuntijoilta kysyttiin tämän kaltaisesta bulevardivaihtoehdosta, jota tässä työssä on arvioitu Helsingin kaupungin uuden yleiskaavahankkeen selvitysten pohjalta.

Avainsanat Keilaniemi, tunneli, tornit, järjestelmien analyysi, muutoskapasiteetti, polkuriippuvuus, kaupunkibulevardi

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1 INTRODUCTION

Planning for Keilaniemi has been a long time in the making. Since the 1990's there have been aspirations to reduce the barrier-effect of Ring Road I, a regional road encircling the core areas of the Helsinki Metropolitan Area. Many plans since have aimed to bring the local neighbourhoods of Otaniemi, Tapiola and Keilaniemi in the area closer together.

The adopted approach has been to dig the road underground, or in the recent versions, to put a lid on it and take it in a tunnel. The plans have included tunneling the ring road both between Otaniemi and Tapiola, and Tapiola and Keilaniemi. Tunneling the road in the Hagalund area between Otaniemi and Tapiola was the first in line, and is the one that also has expressly been marked as a tunnel site in the Uusimaa regional plan and the Espoo master plan. The development focus shifted to Keilaniemi in the end of 2000's because of the incoming construction of the Länsimetro line, and the increased strategic importance of the Otaniemi-Keilaniemi university and business cluster. Espoo City Council accepted the local detailed plan for the road tunnel and four residential towers alongside the deck cover in May 2012.

This thesis is a case study of planning for Keilaniemi land use and transportation. Focus of the report is on project's planning phase, since the solution chosen in 2012 has yet to be put under construction. There has been a challenge with the project cost and making the financial equation for tunnel building to work. Espoo City Council ruled when accepting the plan that the expenses from building this part of Ring Road I should come from selling the plots adjacent to the road tunnel. Hence, of particular interest throughout the case are the different, alternative planning solutions proposed at different times.

In the following section 2 provides the theoretical standing point in looking at the Keilaniemi case. Keilaniemi planning is assessed from the theoretical perspective of systems analysis, path dependence and adaptive capacity. Systems analysis is a measure to assess potential planning alternatives in the very beginning of the project, to ensure the chosen alternative's feasibility and practicality. Path dependence as a concept explains why a chosen solution often is stuck to, and why alternatives maybe are not even considered. Adaptive capacity assesses situations where adaptations to a plan may take place, and characterizes different kinds of adaptations.

The study methodology, research questions and the data collection are described in the section 3. Despite the noted theoretical considerations, the Keilaniemi study has been aimed as a rather open-ended description of events which have led to present situation. Section 4 covers the planning process and decision-making since the 1990's making use of Espoo representative bodies', such as City Planning Board, City Board and City Council, meeting minutes and diverse plans. The analysis has been extended by qualitative data that interviews amongst the key stakeholders provide. The interviewees comment on the aspects of planning and the positive circumstances and difficulties that have occurred. Interview analysis comprises the section 5. With case study being itself the scientific result, many implications and considerations are discussed through the analysis parts 4 and 5. Section 6 is reserved for results summary and discussion.

2 THEORETICAL BACKGROUND FOR THE STUDY OF KEILANIEMI PLANNING

2.1 Systems analysis

According to several scholars, in planning there exists a general problem of alternatives that are not generated early on and therefore mostly not given serious consideration. Priemus (2008) writes in the context of mega-project planning. He notes that when in initial stages of a mega-project decision-making, it is not uncommon for a solution to present itself early. This is a solution that suits the initiators and which then, in words of Priemus, "heads off in search of a problem". Process rarely begins with a proper analysis of the problems involved and an impartial appraisal of alternatives. Those kinds of alternatives, which could solve or reduce the planning problem, are seldom generated and worked out at an early stage. Moreover, any alternatives proffered by opposing camps further down the line are usually too late.

The possible advantages of using a systems analysis approach in a relatively large infrastructure such as the Keilaniemi tunnel and towers plan, in relation to the Keilaniemi planning project, are considered in this thesis. Part of the discussion will be an assessment of alternative solutions to the preferred planning solutions. It will be seen in the interview analysis that several interview participants' notions also point to willingness of applying a more detailed study of problems at an early stage of a project.

Priemus (2008, 105–119) discusses the concept of systems analysis, which usually begins with a detailed problem analysis and leads to an appraisal of alternatives generated to cope with the problems identified. According to Priemus, consistent and frequent application of systems analysis would pay off. In an adoption of a systems analysis methodology the alternatives are generated at an early stage and then ranked according to the ex-ante calculations of costs and benefits.

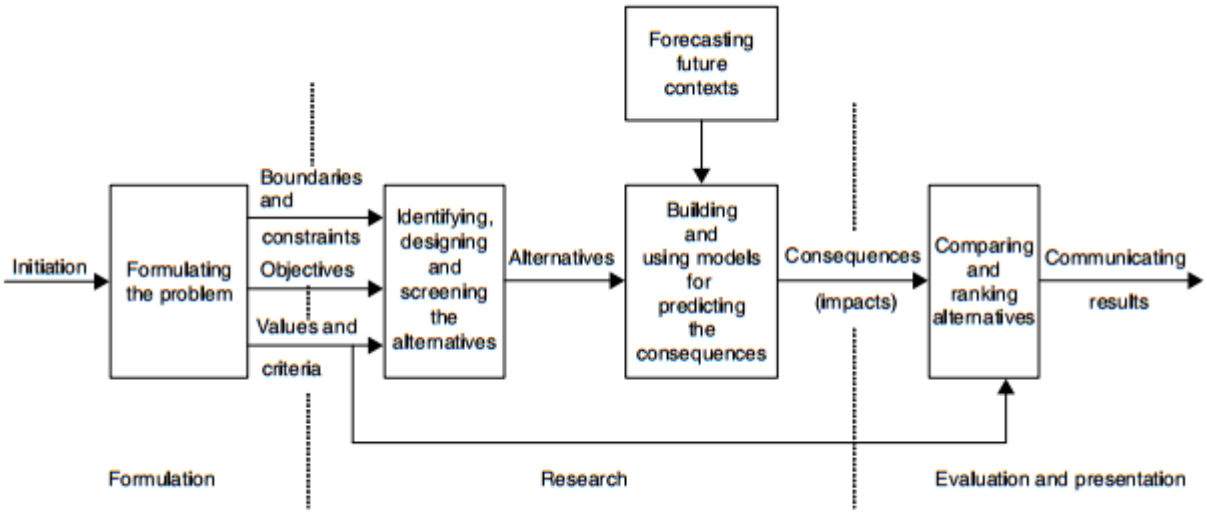


Figure 1: The systems analysis procedure (Priemus 2008, 111; original Miser and Quade 1985, 123).

Problems are often perceived differently by different parties, so it is not only essential to first conduct a problem analysis, but according to Priemus (2008), also to reach the strongest possible consensus. A generally shared problem analysis enhances the possibility that the selected alternative will still be endorsed by everyone at a later stage. In case of difference of opinion on the problem, it usually is the authorized political body that decides on the problems serving as the departure point. In the

systems analysis manoeuvre, alternatives surfacing in later stages must be tested against the problem analysis. For this to be possible, the following aspects during the initial problem analysis need to be concretely specified:

- the values and criteria
- the objectives of the parties and the political bodies who bear responsibility
- the boundaries and constraints

In the beginning of conducting a systems analysis procedure, it is necessary to formulate the problem that the project answers to. What is the nature of the problem and who is affected? What is it likely to become in the short and the long term? In Priemus' assessment of systems analysis the problem often is a transport infrastructure problem, like the Keilaniemi project also partially is. It should be asked why the problem is a problem for one or more players. (Priemus 2008, 110-112) For solving the problem it is important to define the values and criteria and map out the boundaries and constraints (Findeisen and Quade 1985). The next step is to devise alternative solutions that best meet the objectives, values and criteria of the decision-maker and other stakeholders, taking into account the boundaries and constraints. Regarding transport problem planning, there may be for example alternative modalities (train, truck, inland shipping), alternative routes and alternatives in time, including a clear phasing of the alternative projects.

The alternatives are identified, designed and screened. Next models are built to predict the long and short term consequences of each alternative. These are done according to forecasts for, among others, demographic and economic trends and mobility dynamics. The impacts of each alternative are quantified on the basis of the models and assumptions. The alternatives are finally compared and ranked in advance according to their impact – which is the costs and benefits of an alternative. Then, the results are communicated clearly and over time. (Priemus 2008, 110-112)

In reality, systems analysis alone is more complex than what is described in figure 1. Many feedbacks with iteration loops are required to complement the picture. A mega-project can take a very long time to crystallize, and major shifts can take place in the negotiation teams. New policy guidelines and priorities can arise, in addition to changes in building techniques, spatial layout and the cost structure of the project. (Priemus 2008; 112, 115) Often it is difficult to define alternatives. It takes vision and a design approach to come up with options that are unlikely to occur. Mega-projects, which Priemus is talking about, follow a dynamic, iterative and often chaotic course which should be reflected in project management. It can be concurred that there is a need, however, to conduct a proper problem analysis in the start phase and to formulate and flesh out alternatives from the earliest stages.

Bertolini (2007, 1998) discusses different forms of uncertainty that affect transportation and its relationship with the broader context. Uncertainty is of course inherent to any future-oriented activity. A form of uncertainty where an event cannot even be imagined can be called an unknowable. An unknowable event or phenomenon in the advent of the Keilaniemi project may for example be the urbanization trend that is about to take place world-wide and also in Finland. A concrete manifestation is possibly the City of Helsinki plan of boulevardizing the incoming freeways next to downtown areas in its new master plan proposal. This plan edges on having the potential to affect the Ring Road I development in Keilaniemi.

What is the extent and scale where systems analysis should be applied is an open question. The systems analysis approach seems clear and straightforward, and a natural exercise for such a large undertaking as a land use and transportation mega-project. Mega-projects, in the description of Flyvbjerg (2014, xiii), are large-scale, complex investments that typically cost a billion dollars and

up, take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people. The Keilaniemi plan is not a mega-project in terms of its size, but shares with those kinds of projects its complexity, multitude of stakeholders and transformational character. As will be seen, some of the interviewed experts suspected already at the start of planning for Keilaniemi the case turning as complex. It is concluded that as a complex and dynamic plan, the Keilaniemi development project shares many aspects that are generally attributed to mega-projects.

Systems analysis was chosen as a theoretical backdrop because of its concentration on the early stages of a large project. As will be seen, the Keilaniemi plan has been made in a very comprehensive and thorough manner, save for the fact that no alternatives for the plan have been thoroughly considered. In Priemus' (2008) terms, the solution was chosen first, and the problem then defined.

2.2 Path dependence

Another conceptual tool applied here is the notion of path dependence. Path dependence is related to systems analysis, because it is more likely that a chosen solution is endorsed if no other alternatives are construed in the beginning phase of the project. Taking into account a systems analysis perspective, options could be kept open and an alternative solution relied on in event of changes in the environment or institutional set up. Path dependence, or the related but narrower concept of increasing returns explains why even a small endorsement of one option often leads to a path-dependent course of events. This emphasizes the importance of awareness of alternatives and of the initial planning for alternatives.

Pierson (2000) has shown that path dependence, conceptualized by Arthur (1994), can be applied in the field of political science. Pierson specifically talks about one aspect that defines path dependence that is the concept of increasing returns. According to Pierson (2000, 252), in an increasing returns process, the probability of further steps along the same path increases with each move down that path. This happens because the relative benefits of the current activity compared with other possible options increase over time. In the Keilaniemi case, as will be seen, this for example could mean that the relative benefit on carrying on with the tunnel development option increases relative to other options as time passes. Increasing returns processes can be described as self-reinforcing or positive feedback processes. In this thesis, for general clarity, the concept of path dependence is used instead of the more precise increasing returns phenomenon.

According to Levi (1997, 28; see Pierson 2000), path dependence means that once a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice. Notable about path dependence and lock-ins, the outcome that becomes locked in may generate lower pay-offs in the long run than a forgone alternative would have generated (Pierson 2000, 253; Arthur 1994, 112 – 113).

A theoretical concept, path dependence is illustrated by concrete cases, and is perhaps best approached by analysing case studies. For example, in an assessment of post-Berlin Wall urban and transportation planning, Peters shows by depicting the proposal of introducing a north-south rail connection and a central railway station, which is the Tiergarten-Tunnel mega-project, that once chosen, the planning solution is not easily dropped or changed. According to Peters (2010, 90) mega- or giga-projects create political and financial path dependencies and early points of no return that often push forward even those elements of the bundle that would have not been built on their own. In Berlin's example, for example an S-Bahn line came to be partially built but not completed, and

advance construction works for two subway lines were also made, but those remain only partially built, due to financing difficulties.

Bertolini (2007, pages 1998 – 2019) recounts the development and evolution of the land use and transportation planning of Amsterdam since the 1940s. In his assessment, the planning policies have been mixes incorporating incremental model and the rational model of planning. Amsterdam encountered severe crisis in the 1960s and 1970s when a planned city center transformation and underground rail solutions faced prominent opposition, in the later stages even rioting. In the 1990's, an aimed reconfiguration into a business area of a certain neighbourhood came to nought. Instead, the city continued to decentralize and build plot by plot itself around the main thoroughfares that had been built earlier to circumvent the city center. In Bertolini's (2007, p. 2013) assessment, periods of incremental change have been followed by periods of radical change in the Amsterdam land use and transport system evolution, and path dependence has played a decisive role.

2.3 Adaptive capacity

It is desirable that the project organization showcases a big amount of adaptive capacity. This means that when conflicts or changes in the circumstances occur, there is flexibility to change planning approach and the chosen solution even in a later stage of a project. Systems analysis-based design approach that reflects the initial preferences of the various stakeholders will widen the range of available alternatives. As Priemus (2008, 116) characterizes, it is important in the early phases to create plenty of scope for generating and working out alternatives. Those can be then drawn upon, which increases the adaptive capacity of the project. This helps to prevent the role of path dependence in situations where a chosen solution proves to be an ineffectual or undesirable one. Adaptive capacity is another leg on the theoretical toolkit used to uncover and analyse the Keilaniemi project in this thesis.

Giezen, Bertolini and Salet (2015) use the concept of adaptive capacity to describe the flexibility of organizations to respond to conflicts and to prevent them in planning. Their conceptualization derives from organizational learning theory, and depicts four different types of adaptation, or non-adaptation: incremental adaptation, radical adaptation, socio-historical adaptation and inertia. Incremental adaptation stands for changes made in many small steps (see Cyert and March 1963; Lindblom 1979). As Giezen, Bertolini and Salet (2015; see March and Olsen 1984) state it is generally not desirable to fundamentally change present policies or present objectives as that often requires large investments in time, money and skills. Individuals and organizations often adapt because errors that need to be corrected are detected. Planning projects in practice always have some incremental changes made to plans during the course of a project. However, complex problems can rarely be solved within the safe boundaries of current procedures, objectives and policies, and often a more severe adjustment is in order. These kinds of adaptations can be called radical adaptations. They involve the adjustments of the very objectives, policies and practices in a fundamental manner. In the example of Giezen, Bertolini and Salet (2015, 1003) an investment in a change from heavy rail to light rail might be the only way for some rail routes to compete with the car. Radical adaptation can conceptually be seen breaking from the dependent path that has been taken previously.

Adaptations made to the institutional and social context of an organization might sometimes be the only way to deal with persistent issues. Asymmetries of power and context might cause barriers for adaptation in certain situations. The kind of needed socio-historical adaptations have a lasting impact on future practices and change the playing field, as the adaptations affect future similar practices. New institutional arrangements or for example organizing project teams differently can become new standards for future practices. Inertia, lastly, is a situation in which there is a pressure or necessity for adaptation, yet none is made. This happens, according to Giezen, Bertolini and Salet (2015, 1003; see

Bateson 1972), because the general preference in organizations is to continue with existing institutional routines in which new information is routinely acquired or where there is an automatic response to a stimulus.

Contextual change at some point triggers adaptive capacity of a planning and decision-making process, and leads to different kind of outcomes depending on the mechanisms activated. According to Giezen, Bertolini and Salet (2015, 1002), tendencies to adapt and to learn are not evident and not similar for all agents, but need to be specified in the particular context of cases. Thus, in the case of Keilaniemi, the instances where adaption has occurred are specifically depicted and analysed in the following.

Redundancy in planning means building into the process more alternatives than would be strictly necessary or efficient. It enables using alternatives when the first preference turns out unachievable, impractical or undesirable (Landau 1969; Low et al. 2003; see Giezen 2013). Redundancy in actors is important, because external actors can provide feedback mechanisms that are necessary to remain critical to one's own ideas. Redundancy in knowledge is also essential for adaptive decision making (Allen 2001; Nonaka 1994; Schindler and Eppler 2003; see Giezen 2013, 727).

Bertolini (2007, p. 2000) also discusses the redundancy in planning. According to him, beyond a certain threshold, marginal change in routines will not suffice, and coordinated change will be required. Because it is uncertain which routine – or form of capacity to adapt – will break the impasse, diversity of and competition among alternatives should be stimulated. Redundancy of routines makes the economic system resilient: it is capable of continuous performance in the face of changing uncertain circumstances. The changes and uncertain circumstances that the Keilaniemi project faced over its course until the implementation phase concerned especially the financial challenge of keeping the project under the budget limit, which is one of the themes that will be discussed in the following sections.

Giezen (2013; see Dryzek 1987; Faludi 1996; Miller and Lessard 2001) claims a common response when faced with complexity and uncertainty in planning of big projects is to simplify, by which he means that procedures and events are compartmentalized into smaller sections with accompanying calculated risks. For example, procedure of phasing the development can be seen as an adaption that responds to a challenge that a project meets. As we will see in further analysis section, the Keilaniemi tunnel and tower project will be cut into several smaller phases that are funded separately. Giezen (2013, 723) notes that a process that is compartmentalized becomes inflexible as every end of a phase needs to fit with the beginning of the next predetermined phase, leaving little room for adaptation. It will also be seen in practice whether this is the case with Keilaniemi as well, at the latest when the next project phases are decided on.

3 RESEARCH METHODS

3.1 Research questions

In the focus in this thesis is the planning process of the Keilaniemi tunnel and residential towers plan. Therefore, the primary research object focuses on the characteristics of the process. A central viewpoint for the Keilaniemi planning case are the planning solutions taken and alternatives created, for example, to reduce the development costs and to shift the cost-revenue balance towards enabling new building. The available alternatives for lowering the costs are different and offer differing objectives for planning. In addition to taken up solutions, it will be looked at what alternative solutions, or adaptations, would have been or still be possible. According to the research theory, adaptations can be either incremental, radical or socio-historical, or there may not be adaptations at all, in which case a planning process faces inertia.

When contacting experts to conduct the interviews, the topic of the thesis given for them was land use - transportation interaction, for the two are closely connected especially in planning for cities. This interconnectedness, in addition to the characteristics of the planning solution and the questions of development costs and revenues, is explored throughout the thesis, which contributed as a research question.

The research questions for the thesis are the following:

1) What has the planning process been like in Keilaniemi and what have been the decisive planning solutions and the adaptations made during the process?
2) What have been the goals in the Keilaniemi process and how do the land use and transportation planning objectives interact?
3) What kinds of alternatives would there have been in the Keilaniemi planning case?

3.2 Methodological choices

The interview questions (Appendix 2) were drafted keeping two objectives in mind. First, the thesis produces explorative work, using a rather inductive method of analysing. It was thought the questions should be, if possible, open and rather general in nature. The aim was not to test and validate any particular theoretical proposition, as a deductive research method would do. Second, it was aimed to take a look at the Keilaniemi planning case from diverse viewpoints, in order to reach all the relevant aspects with regards to the case. As a consequence, the ensuing interviews were rather general of nature, emphasized by the fact that general open-ended questions regarding any land use and transport planning were asked in the end of the interviews.

The aim of this thesis is to achieve a so-called “thick description” of events, choices and justifications for the chosen solutions. According to Laine, Bamberg and Jokinen (2007, 9), thick description is a thorough and precise description of the studied phenomenon. In an essay addressing thick description as a study method, Geertz (1973) refers to culture as context within which social events, behaviours, institutions and processes can be intelligibly – that is, thickly – described. It is for the detailed understanding of events (cf. Flyvbjerg 2011) that both the planning document and meeting minutes analysis and the expert interview analysis are rather extensive in the thesis.

The description of events, justifications and choices means handling a case study. Case stories cannot be briefly recounted or summarized in a few main results, but the case story itself is the result (Flyvbjerg 2006). Häikiö and Niemenmaa (2007, 53) stress that by this method it should be possible for the reader to assess and judge by themselves the turns of events. This increases also the validity

of the arrived-to analyses. When exploring the case the intended payback is sensitivity to the issues at hand, something which cannot be obtained from theory (Flyvbjerg 2006).

Flyvbjerg (2006) describes how he tried to capture the rich ambiguity of politics and planning in the seminal case study on the Aalborg city transportation plan. In his view the most interesting phenomena in politics and planning, and those of most general import, would be found in the most minute and most concrete of details. Flyvbjerg specifically stresses the importance of case studies for amassing expert knowledge of one's subject field. According to him, common to all experts is that they operate on the basis of intimate knowledge of several thousand concrete cases in their areas of expertise. In this view context dependent knowledge and experience are at the heart of expert activity. (Flyvbjerg 2006, 222)

According to Laine, Bamberg and Jokinen (2007, 26) a starting point of research is a phenomenon or a case that interests researcher. The researcher often has prior knowledge of the phenomenon, and the research problem starts developing from this. This situation applied also to studying the Keilaniemi case. To disentangle the research problem research question starts to get developed, which then leads to different kinds of empirical sources. Similarly, the researcher should consider how a certain kind of empirical material would help to answer to a research question. The case together with the target or object of research and research questions define what are the most central empirical data sources and methods. According to Laine, Bamberg and Jokinen (2007, 31) the purpose of a case study is to make the case understandable.

Like case studies in general, conducting a study of Keilaniemi planning involves determining what the case is actually a case of. As Laine, Bamberg and Jokinen (2007, 10) cite the question of Wagenaar (2005), researcher should ask: *in which case this case is a case?* The object of the study to a large extent determines which characteristics or viewpoints researcher is specifically interested in. Moreover, a study is not merely a depiction of how the events unfolded, but contains an interest towards a tension within the case. Laine, Bamberg and Jokinen state that a case researcher should distinguish between the case and the object of research. In the Keilaniemi case the specific object of research are the planning choices and alternatives that have been available and taken up. The tension within the case of Keilaniemi relates to the different opinions of the solutions and the financial adversity the project has met.

Case study research is a well-applied method in studying mega-projects. In fact, a study of a mega-project or any project in general is, by definition, a case study. As described in section 2.1., the Keilaniemi case can be referred to as a mega-project in many aspects if not for the scale of the project. According to Laine, Bamberg and Jokinen (2007, 9), the object of research in a case study is a chain of events or a phenomenon where a small number, often just one, cases are studied. For example the studies addressed in section 2 of Giezen, Bertolini and Salet (2015) and Peters (2010) are case studies of mega-projects.

In essential readings volumes of megaproject planning and management (Flyvbjerg 2014), most of the mega-project studies are of their nature case studies handling one or more cases. The land use and transportation mega-project case studies can be exemplified by the studies of high-speed rail in Europe (Vickerman 1997), London and Denver airports (Davies, Gann and Douglas 2009; Gil, Miozzo and Massini 2012; Montealegre and Keil 2000; Szyliowicz and Goetz 1995) and for example Mekong river water diverting and hydropower (Molle and Floch 2008; Bakker 1999). This shows the strong link between the understanding of mega-projects and case study research.

The strategies for selecting cases (Flyvbjerg 2006, 230) may be useful in thinking about the Keilaniemi case. Extreme cases for example can be suited to get a point across in an especially dramatic way. This kind of case is for example *Panopticon* as an archetype of a European prison (Foucault 1975; see Laine, Bamberg and Jokinen 2007, 32). In contrast, a critical case can be one defined of having strategic importance in relation to a specific problem. It is the least likely or most likely case regarding the phenomenon that is studied: if a phenomenon takes place in a critical case, it applies to all the other cases. In this regard, Keilaniemi is a critical case in a sense that if building a tunnel in the hope of providing land for development in a central location with a seaside view is not economically feasible, tunnel building as a land use development tool will be feasible in quite rare circumstances.

Laine, Bamberg and Jokinen (2007, 32 – 34) represent many types of cases, in addition to the extreme and the critical, for example the typical type of a case. Typical case is a situation or a process that is assumed as presenting average characteristics in what is studied. It is argued here that, in part, the Keilaniemi case represents a typical case, allowing a study of typical perspectives, processes and characteristics that take place in planning for road and street infrastructure and city building. Roofing a large thoroughfare to mitigate its harmful effects is a procedure that has been done or considered in several places in Finland. Keilaniemi, as a plan to cover a large thoroughfare amid city structure, is maybe also typical in representing a detachment between transport and city planning objectives, something which is discussed in further chapters.

Häikiö & Niemenmaa (2007, 41 – 56) talk about the choices that a researcher makes and has to justify. According to them, the choices during conducting a study are not always linear and are under constant reflection, which has been the case also conducting this study. Relating to their own studies, Häikiö & Niemenmaa conclude a starting to point of research in an empirically driven case study is not theoretical considerations. Only after getting acquainted with the case, collecting the empirical data and understanding the context helps to understand which theories work the best and help to understand it (see Gillham 2000, 2).

Häikiö & Niemenmaa (2007, 51) write that it is sometimes thought that theory is something ready that only awaits the application. When conducting a case study, it becomes clear that researcher shapes the theory that is then used in research. On the other hand, sometimes the theoretical literature open up possibilities for explaining the case and shape the approach during the study. This to some extent happened in this study as well. It was deduced that the theories of adaptive capacity and systems analysis in particular help to shed light on the Keilaniemi planning case.

3.3 Study process of the Keilaniemi towers and tunnel

The exploration of the planning in Keilaniemi had its start within the APRILab project of the YTK Land Use Planning and Urban Studies Group at the Aalto University in Espoo, Finland. APRILab's (Aalto university 2015) project area was the so-called T3 area in Espoo, where the three t's stand for science, art and economy (*tiede*, *taide* and *talous*). T3 area consisted of three separate areas of Otaniemi, Keilaniemi and Tapiola, which are separated by Ring Road I which circumnavigates the core of the Helsinki Metropolitan Area. According to Markkula and Kune (2015, 16), T3 is now called as Espoo Innovation Garden as a result of recent development. According to the Espoo Innovation Garden vision, instead of traditional university facilities, laboratories for research and innovation are regional innovation ecosystems that operate as test-beds for rapid prototyping of many types of user-driven innovations. Espoo Innovation Garden aspires to become a global pioneer as this kind of societal innovation test-bed.

Tunneling the state-owned road Ring Road I, the major endeavour of the Keilaniemi area and a solution to integrate the three areas of Otaniemi, Tapiola and Keilaniemi, had in 2014 run into financial dead-end during its planning. Tunneling the road also was seen as essential in order to achieve four high-rise residential buildings that Espoo and the construction company SRV had envisaged next to the ring road and the forthcoming western metro Keilaniemi metro station. By the decision of the Espoo City Council (2012e), the road development should not cost more than what the city can receive from selling the building rights or plots of the four towers. The ends did not seem to meet and it was necessary make them to. As part of this discussion, for instance a work shop for all the key stakeholders was prepared by the APRILab project in November 2014. Studying the financial feasibility and the adaptations in planning thus came forward as the defining features of the project.

It became evident in the fall 2014 that the Keilaniemi development plan would progress further with the achieved adaptations to the road design by Espoo and the road construction consultant Ramboll. Studying Keilaniemi planning started in the beginning of 2015 by drafting a case description based on Espoo City Council, City Board and Planning Board minutes and the planning documents received from the City of Espoo and construction company SRV for the use of the APRILab project. The final case description of the Keilaniemi plan comprises the following section 4.

Drafting for the case study thematic interview questions, and selecting for and approaching the intended interviewees, took place largely in March and April 2015. The thematic interview questions used in expert interviews are rather general and open-ended in nature, to capture the essentials of the Keilaniemi case as the interviewees saw them and to make possible the inductive approach used in the study. In the interviews it was aimed at gathering the data so that every relevant aspect would be covered. Questions related to both land use and transportation planning from various aspects were made. The thematic interview questions used can be found in Appendix 2.

In addition to the questions in the interview questions list (Appendix 2), additional questions about the Hagalund area planning were asked from most of the interviewees. This turned out to be a good choice, since it was revealed during the interviews round that planning for Hagalund will be connected to the planning process for Keilaniemi. Questions were also being asked about the prospect of boulevardization in Helsinki and of using similar approach in Keilaniemi. Espoo City Council had called for making estimates of costs and amounts of land use, also in an alternative of building next to a city street at Ring Road I in Keilaniemi (2014b), and architect Carlos Lamuela (2010) in his master's thesis had made a sketch of boulevardizing the Ring Road I on the Karhusaarentie road in Keilaniemi, thus making the city boulevard a potential alternative. To visualize the alternatives, maps in figures numbers 9 and 17 (pages 20 and 34) were shown to the interview participants. Other maps used as a help of speaking of certain places during the interviews were the figure 22 (page 48) and the comparison of available building space in the Espoo and the Lamuela alternatives (Appendix 3).

The inconvenience of using maps as visual aids was that the interviewees tended to speak of things in relation to a map at hand (describing something happening "here" or "here"), which sometimes later caused a difficulty to pinpoint the exact places when listening to and analysing the interviews. This was alleviated in later interviews by saying aloud the place names that were being referred to. In the end of the interviews, all the interviewees were asked three very general questions about their ideas of land use and transportation planning and the interconnectedness of those. These produced varied reflections, which were largely not used in the analysis, but which provided nevertheless several insights and some recurring themes – often regarding the cooperation between land use and transport planners among different stakeholders.

The interviewees were selected based on the knowledge acquired by getting to know the planning case. Only few changes occurred during the interviewee gathering and interviewing phase. One approached expert declined the interview, but suggested two suitable alternatives from their organization. One envisioned interviewee was at that moment on job alternation leave, but proposed a replacement of similar status and position. Possible persons to be interviewed were discussed with the APRILab project participants of both the City of Espoo and SRV company. Other than mentioned all the sought-after key persons accepted and were interviewed. During the interviews some interviewees gave valid input and proposed prospective experts to interview, which were then selected. The interview of the Finnish Transport Agency was added in the later phase of the interviewing stage after having realized the key role of this state agency. An interview with an expert from HSL – Helsinki Region Transport who organizes the public transportation in the region – was also set up, but cancelled after having been concluded HSL does not have a prominent stake in the studied Keilaniemi planning process.

Figure 2: The created codes in Atlas.ti analyzing program. Codes are translated from the original codes that were in Finnish. Quotation count is dependable on the style of creating codes and assigning codes to text, and conclusions should not be drawn from it, although it is a certain indicator of the frequency each subject were brought up in the interviews. The code names are reproduced here for reasons of validity.

Code	Amount of quotations for a code
big questions in transport and city planning	13
boulevardization option	34
building on top of a tunnel	22
changes in modus operandi during one's work career	15
decision-making situation	8
ELY's role in negotiations	37
emissions and noise	13
fluency of traffic	41
Hagalundinkallio	24
how should transport and land use planning be developed?	16
how transport modes work together?	2
lowering the costs of the solution	9
nature of the project, i.e. pros and cons	31
other development in Keilaniemi	16
personal relation to the project	16
phasing	16
principles of transport planning in the project	43
problems in the process	38
responsibility for paying the development	24
role of SRV in going forward	12
specific comments to take into account	1
start of metro traffic	1
start of planning for the project	14
walking and cycling	27

13 interviews were conducted, with 8 male and 5 female participants. As a result was a bit over 15,5 hours of interviews. The shortest interview length was 56 minutes, with the longest being 103 minutes, and the average duration of the interviews as 71 minutes 48 seconds. More detailed figures regarding the interviews is provided in Appendix 1.

The thirteen interviews can be seen as sufficient to have covered the essential characteristics and facts about the case. Certain themes started surfacing, like the developer-led nature of planning in Espoo, the challenge of building on top of a deck, the different ideas between stakeholders of the scale of the road planning choices and the relationship between paying and deciding for the planning solutions for the road and tunnel.

After conducting the interviews in Finnish, they were transcribed and then read through once. Some opening remarks were made at this point of analysis. The interviews were listened to second time, at the same time correcting possible errors in transcription. The data was then taken to the Atlas.ti qualitative data analysis programme, where theme-by-theme codes were created and interview excerpts assigned to the codes. Coding (see figure 2) was yet done in Finnish, and English was used when writing out the analysis.

Coding is based on the impressions on the contents of the interview data, and proved to work from the first interview onwards; there was no need to change the coding system during the analysis process. This should prove the correctness of the acquired in-depth conception regarding the various aspects of the project. Many of the text passages were assigned with several codes, thus creating overlap between themes. This means that when writing the analysis the majority of the interview material was used, even though not all the codes were used when making the analysis. When writing those themes or codes that best shed light on the case were used.

After coding the text extracts, the first draft of the analysis was written using the codes one by one. In principle writing the analysis followed the method described by Eskola (2010, 187-199). During writing a matrix was created where columns were the individual interviewees, and the rows represented one code. Generally speaking, one specific code resulted in one separate subsection in the analysis part. As goes the method described by Eskola (2010, 193-194), the most interesting parts were first used in writing out the analysis. Each interviewee provides naturally a different viewpoint to a case, so it did also differ which interview passages were deemed the most interesting for a particular code. All the interviews for each code were eventually gone through, adding to the analysis text interview by interview. Or, as Eskola defines the process, one operates utilizing the idea of analytical induction with a snowball method: first building the solid core of analysis, then adding mass from the other interviews.

The analysis process resulted in listening to or reading the interview data five times after the interviewing moment. This lead to a detailed understanding of the qualitative data and rather specific insights of the planning process characteristics.

4 KEILANIEMENTUNNELI – THE PLANNING PROCESS

4.1 Keilaniemi as a development site

On 21st of May, 2012, the Espoo City Council accepted a new local detailed plan in the Keilaniemi area in Espoo (City of Espoo 2012f). The plan includes new housing development next to the upcoming Länsimetro station in Keilaniemi. The new housing units would be, according to the plan, high-rise buildings of 32 to 40 floors. It is included in the local detailed plan that Ring Road I, the regional state road that runs through the Keilaniemi-Otaniemi-Tapiola area, will be covered for a distance of almost 500 meters when passing the new residential towers and the metro station.

Ring Road I is a state-owned and managed road, meaning planning for it generally has to follow the standards that a regional state authority, in this case the Uusimaa Center for Economic Development, Transport and the Environment (ELY), imposes. The Ring Road I does not permit building for health and safety reasons immediately on the side of this motorway, on the traffic protection area, where the proposed towers are being located, without the concrete cover (figures 3, 4 and 5).

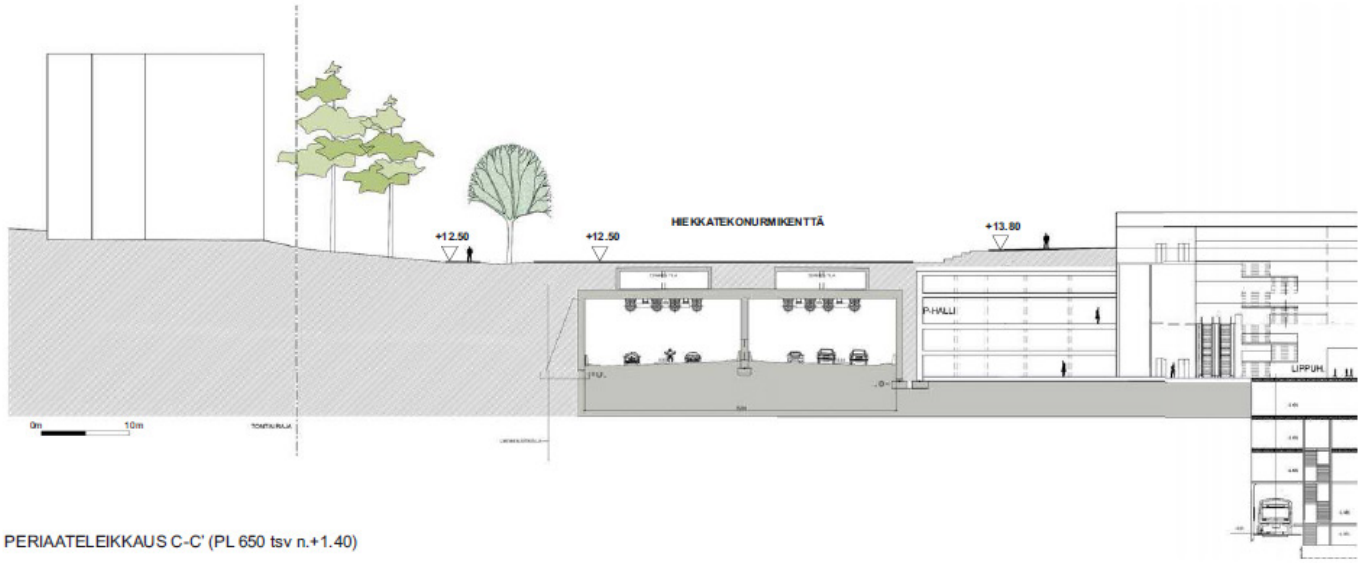


Figure 3: Cross-section of Ring Road I (Maisema-arkkitehdit Byman & Ruokonen, Arkkitehtitoimisto SARC Oy and SRV Oy 2011). Road tunnel is in the middle. On left building borderlines in Tapiola Itäranta. On right parking facilities, and the base building for the residential towers, which also acts as commercial facility and entry to metro tunnel, which is depicted in the lower right corner.

The plan enhances conditions for the motorized transport. The expanded road enables removing couple of traffic lights, by removing at-grade intersections and replacing them with grade-separated intersections, and raising traffic speeds. It has been assumed that the traffic volume in the transportation network increases approximately 1,5-fold in and near Keilaniemi by 2035 (City of Espoo and Uusimaa ELY Center 2012). The road expansion is aimed at meeting the projected demand and to ensure fluent traffic flows. On top of the deck that would cover the road there would be a park for the use of area residents.

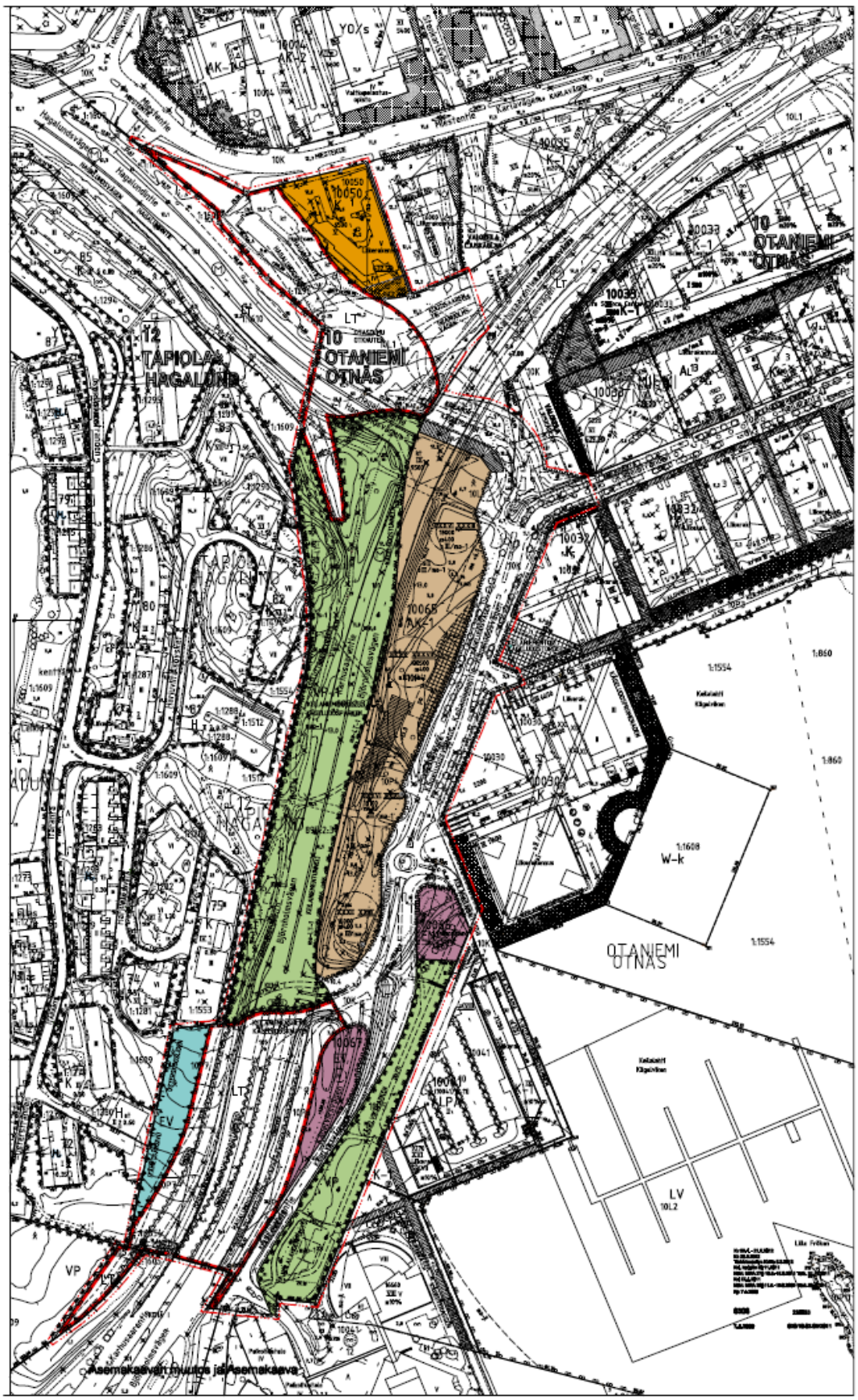


Figure 4: The Keilaniemi local detailed plan (City of Espoo 2012a). Plan area is within the red borders. In plan white is traffic areas, brown the plot areas for residential towers and green is park. Blue is protection area for traffic, violet the areas for community and energy management, and orange is area reserved for a commercial or office building.

Keilaniemi is, as of writing this thesis, still an area displaying exclusively office buildings and headquarters. It houses a few high profile Finnish enterprises: Fortum, Kone, Neste Oil and for example the former Nokia, which currently makes part of the Microsoft company. Keilaniemi is also a well-known site for building high in Finland since 1970s. The Fortum headquarters, at the moment still the highest high-rise office building in the country, will supposedly be converted to residential use (City of Espoo 2014c; 2014g; 2015d). As the minutes of the city council meeting in 2012 tell (City of Espoo 2012f), the general outlook of the area is dominated by heavy traffic. The proposed residential high-rise development would make use of the forthcoming Keilaniemi metro station and bring day-around activity and liveliness to Keilaniemi.

The alteration of the detailed plan brought 90 400 square meters of permitted building volume to Keilaniemi. The four residential buildings represent the bulk of this building volume; 83 900 square meters with a block density of 4,2. The local detailed plan area size is approximately 12,5 hectares which includes also 3,5 hectares of parks. The area reserved for building blocks is in total 2,5 hectares, making consequently the area for traffic as 6,5 hectares.

The decision-making process leading up to the acceptance of the Keilaniemi detailed plan, and to the possible future construction of the road tunnel and the residential units, is in the core of this thesis. With this regard, the alternatives and taken-up solutions are being analysed. It is of interest how and on what basis the development plan actually came along. Hence, the full details and workings of the road widening and the residential development are not of interest here.

The local detailed plan accepted on 21st May 2012 achieves to merge two mutually excluding objectives: introducing residential development in this rather central area of the Helsinki metropolitan area, and to make possible an increasing use of car. The deck that would cover the Ring Road I section on Karhusaarentie road in Keilaniemi would lower the expected levels of noise and emissions caused by traffic.

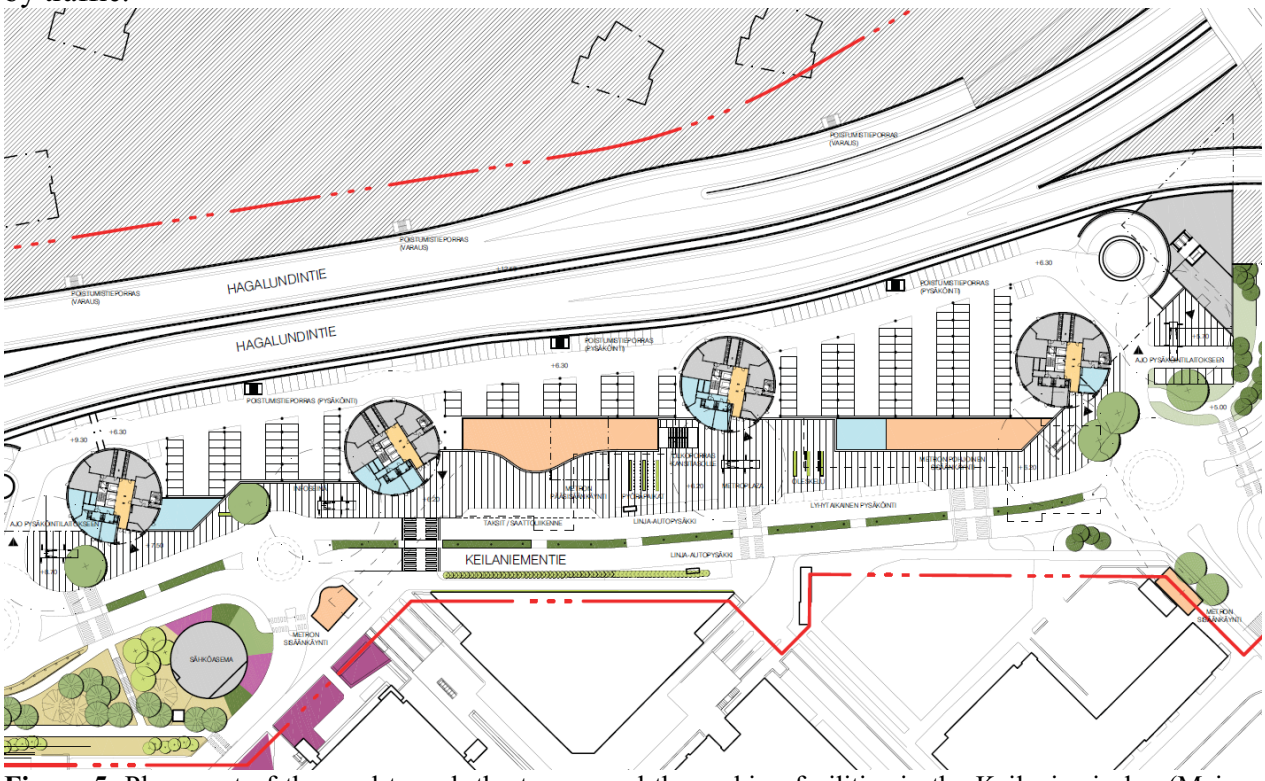


Figure 5: Placement of the road tunnel, the towers and the parking facilities in the Keilaniemi plan (Maisema-arkkitehdit Byman & Ruokonen, Arkkitehtitoimisto SARC Oy and SRV Oy 2011).

Figure 6: Keilaniemi from south-east in an illustrative picture (City of Espoo and Uusimaa ELY Center 2012). The four residential towers are close to the tunnel entrance. The current Fortum headquarters is on their right, and the former Nokia, current Microsoft on the foreground next to the Länsiväylä intersection. The lower portion of the picture is Karhusaari.

4.2 The early stages of the car tunnel development in the Keilaniemi-Otaniemi-Tapiola area

Planning for the land use and transportation solution for Keilaniemi and adjoining areas contain several reports and accounts of different perspectives. Detailed planning for the Keilaniemi-Otaniemi-Tapiola tunnel development on Ring Road I started in the middle of the 2000s. At first the development for local detailed plans did not concern the Karhusaarentie area in Keilaniemi, but primarily the Hagalundintie road section between Otaniemi and Tapiola. On 22nd January 2004 the Espoo City Planning Board accepted a target programme and the plan for participation and evaluation for a new detailed plan in the Hagalundinkallio area (City of Espoo 2004a).

Hagalundinkallio (see figure 9, page 20) is a plot of land that locates between Otaniemi, which is a venue for the Aalto University and several other research institutions, and the garden city of Tapiola. A rocky hill ("kallio") on the area is suitable for tunnel construction. According to City Planning Board (City of Espoo 2004a) the revision of the local detailed plan and a new local detailed plan would have had the section of the Ring Road I put in a tunnel between the streets of Kalevalantie and Tapiolantie. The traffic area made redundant would then be made available for new construction of residential and office space. The minutes from the meeting indicate that the specific proposal had been initiated in the city planning report in 2003.

A target programme for the area from 2004 claims that putting the road into a tunnel had been investigated and developed in several reports since 1994. Some Espoo representative bodies meetings' minutes (e.g. City of Espoo 2002) find that covering Ring Road I first came up when architect Kai Wartiainen looked into the planning alternatives for a Spektrimarina project (Arkkitehtitoiminta Kai Wartiainen Oy 1996), where one of the general land use alternatives was a so-called Apila ("clover", "shamrock") model. Of particular relevance for the later planning is the

decision of the Espoo City Planning Board in 1997 to choose Apila as the long-term vision for the area (City of Espoo 1997). When Espoo City Planning Board dealt with the Spektrimarina project target programme on 9th October 1997, the target programme defined the quality level for an office and seaside hotel development at the southern part of Keilaniemi, which at the time was in use by a boat harbour. The Spektrimarina project was eventually not put in further detailed planning. The Spektrimarina vision, however, and the chosen Apila model were later referred to by Espoo City Board, which seemingly adopted the concept in its meeting (City of Espoo 1999).

Figure 7 on page 18 shows two of the planning solutions that were on the table with respect to the Spektrimarina project in 1997, the Varsi and Apila alternatives. Varsi provided building next to the ring road in a street-like manner, and is described as a demanding and ambitious solution for city planning. The benefits of a roughly similar solution will also be assessed in this thesis as regards a more recent city boulevard option. Apila discussed a large area with a relatively low density, where the project plan envisioned bicycle as the ideal mode of transport. The Apila model was later (City of Espoo 2002) characterized as the most ambitious option in terms of city planning. Espoo City Council, which handled the proposal of putting the ring road underground in 2002, noted that the Spektrimarina work of 1996 had not in any way worked out the implementation of the underground grade-separated intersections in the model.

The development plan of 1993 (Tielaitos and City of Espoo 1993) had the Ring Road I located in tunnel neither at the Hagalund area nor in Keilaniemi. The development plan charted grade-separated roundabouts in both the Kalevalantie and Karhusaarentie intersections. Otaniemi land use plan of 1994, on the other hand, talked primarily of Otaniemi, but located new development on the Hagalundinkallio area on top of Ring Road I in a tunnel. The 1994 land use plan proposed 17 000 floor square meters of office premises and parking on top of the deck, and little less than ten thousand floor square meters of residential and commercial development along nearby streets. (A-Konsultit arkkitehtitoimisto, LT-Konsultit and Arkkitehdit Paunila & Rautamäki 1994)

In 1999 a preceding general plan for Ring Road I had been completed (Tielaitos 1999), which looked more closely upon developing the road in the section between the Kalevalantie street, Leppävaara and the Helsinki border. It included a tunnel in Hagalund, but not in Keilaniemi. In this plan a grade-separated intersection in Otasolmu (the Karhusaarentie – Hagalundintie intersection) is listed as a solution to be realized at a later stage, after the more northern developments. The general plan of 1999 (Tielaitos 1999) had not investigated developing tunnel in Keilaniemi, but the Espoo City Council meeting of 2002 urged upon inspecting a tunnel until the Länsiväylä road (City of Espoo 2002). The 2002 Council meeting minutes elaborates on the advantages of the Apila model, and state it makes possible unifying and densifying the city structure in such a central area. The depiction of plans for land use states that all the further development in the area would take into account putting Ring Road I underground.

The Wartiainen proposal thus provided alternatives for further planning, which turned out to have lasting impact for the further planning and development in Keilaniemi. The planning alternatives were not, however, based on a thorough assessment of the values and criteria with different stakeholders, or costs and benefits of different alternatives, such as the systems analysis procedure would predicate (Priemus 2008). The Apila model was chosen when assessing a specific local detailed plan. Still, the Espoo City Planning Board decision (City of Espoo 1997) in part defined the land use and transportation planning solution for a larger area for a long term. It can be easily noted that the initial decision towards this direction created at least a strong strategic path dependence (Pierson 2000). The early Apila model seems to have led to the prevalence of tunneling in the later planning model incarnations as well.

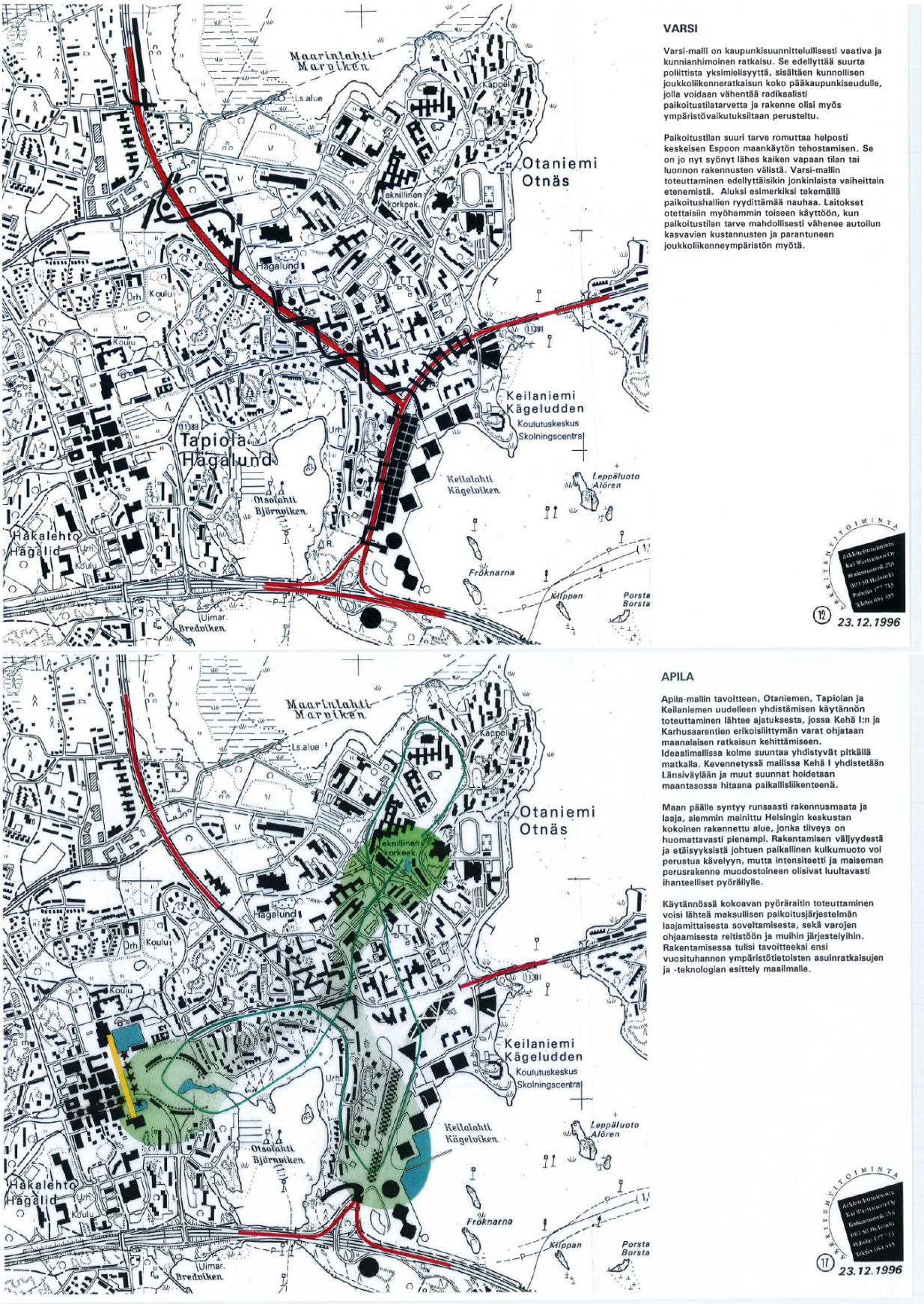


Figure 7. Two alternatives for an early Keilaniemi local detailed plan target programme from the Wartiainen's Spektrimarina concept (Arkkitehtitoiminta Kai Wartiainen Oy 1996; City of Espoo 1997). Varsi provided development on the side of Ring Road I, and Apila proposed a tunnel which would remove the barrier-effect of the road between Otaniemi, Tapiola and Keilaniemi.

Figure 8: Ring Road I at the Tapiolantie intersection on Hagalundintie. Tapiola is on the left and Otaniemi on the right. The Otaniemi water tower on the right side of the road can be seen on top of the hill. Source: www.google.fi/maps.

The Espoo City Planning Board had started to deal with a proposal for the new master plan for the southern parts of Espoo on 18th December 2003 (City of Espoo 2004a). The Hagalundinkallio area had in the master plan proposal at that point been marked as urban residential neighbourhood and a workplace area. The Ring Road I had a reservation for a tunnel in Hagalundinkallio in the proposal.

The Hagalund detailed plan target programme, that the Espoo City Board for its part accepted on 30th of March 2004 (City of Espoo 2004b), also elaborates on the benefits of the Apila model. In the programme it is stated that the areas of Tapiola, Keilaniemi and Otaniemi were to be connected by covering, or "tunneling" as the term goes in Finnish, the ring road on part of the Karhusaarentie road and on Hagalundintie. By doing this the barrier effect caused by the traffic arteries would be eliminated, new land for construction would be obtained, the harmful effects of traffic would be made smaller and transversal passages for walking and cycling provided between the three areas.

The target programme (City of Espoo 2004a; 2004b) by and large also acknowledged the centrality of the area for the whole Helsinki metropolitan area. The barrier effect caused by Ring Road in the Otaniemi-Tapiola-Keilaniemi area has thus long been recognized. The 2004 target programme and the related city board meeting minutes also show that the chosen solution for developing Ring Road I and managing the barrier effect has continuously been that of tunnelling the road. The progress of planning features several incremental adaptations from previous plans, which is commonplace for any complex planning project.

A so-called prereport about putting into a tunnel the Ring Road I was published on 17th March 2003 (SCC Viatek Oy, A-Konsultit Oy and LT-Konsultit Oy 2003). In this report the section to be tunnelled had been divided in two; the northern part in Hagalundinkallio and the southern part, the then so-called long section, of the future tunnel of Keilaniementunneli. The target programme of 2004 suggested that the southern section in Keilaniemi would only be built after the northern part. Of notice here is the prereport estimate that the expenses for covering the northern part of the tunnel development would be gotten back by introducing 70 000 square meters of new building rights. Half of that building right would be for residential, and the other half for office development. It was envisaged according to the examination of alternatives that from 65 000 to 72 000 square meters of permitted building volume would be located in the area. (City of Espoo 2004b)

Figure 9: The study area in 2015. On the map have been added the neighborhood names Otaniemi, Tapiola and Keilaniemi, the places Hagalundinkallio, Itäranta and Karhusaari, as well as the road names Ring Road I, Länsiväylä, Karhusaarentie and Hagalundintie, and the street names Keilaniementie, Kalevalantie and Tapiolantie. Map source: www. opentstreetmap.org.

In the process of preparing new detailed plan for the Hagalundinkallio area it was emphasized that the Otaniemi-Keilaniemi area is a significant cluster of work places. The fluency of traffic and the availability of homes were identified as a big and an ever-growing problem. The City of Espoo Planning Board (City of Espoo 2005a) stated that the forthcoming rail transit solution in the form of the metro line should be maximized taking into account residential development. It was stated at this point that the costs for tunnel building and the whole infrastructure in the area would be high, which entails that the development should be financed by the added permitted building volume. The March 2005 meeting of the planning board thus urged looking into permitting a larger building volume than had been indicated in the planning proposals. It also necessitated that additional accounts should be made on the safety and implementation of the proposed tunnel.

The planning until this point considered the area in Hagalundinkallio, of putting into a tunnel of Ring Road I between the Tapiolantie and Kalevalantie streets, and of addressing the required changes in local detailed plans in that area. The second, southern, tunnel planned in the Keilaniemi area, was not considered primary. In a meeting of 16th of June 2005, however, the City Planning Board urged the city planning office to prepare an overall picture of the tunnel development and changes considering the transportation system all the way until the Länsiväylä road in the south (City of Espoo 2005b).

The next decision to have in mind the whole picture of tunnel building from Maarinsolmu to Länsiväylä was discussed in the City Planning Board meeting on 29th September 2005 (City of Espoo 2005c). In its minutes, the board wanted to emphasize that the planning is dealing with the most strategically important area in Espoo. It considered the upcoming change in the urban structure decisive for the Otaniemi-Tapiola area. The planning board hoped that it would secure a solution that 1) works well for the increasing amount of traffic and helps to reduce emissions and other traffic malfunction, 2) produces high-quality housing and 3) helps the scientific, technological and business locus to grow into an ever more internationally significant and unique campus area. The planning board necessitated for the following planning that tunnel development be clarified and depicted in the whole area until the Länsiväylä road. This decision may also mark the turn in the process where the emphasis shifted from the Hagalundinkallio area tunnel to at least the Ring Road I in the whole Otaniemi-Tapiola-Keilaniemi area, and possibly predominantly to the Keilaniemi area.

A new regional plan for the whole larger Uusimaa region in and around the Helsinki metropolitan area was accepted on 8th November 2006. In the regional plan a motorway in a tunnel was allocated between Otaniemi and Tapiola, but not in the Keilaniemi area. There also is indicated a regional rail line which later came to materialize as the Länsimetro line extension. (Helsinki-Uusimaa Regional Council 2015)

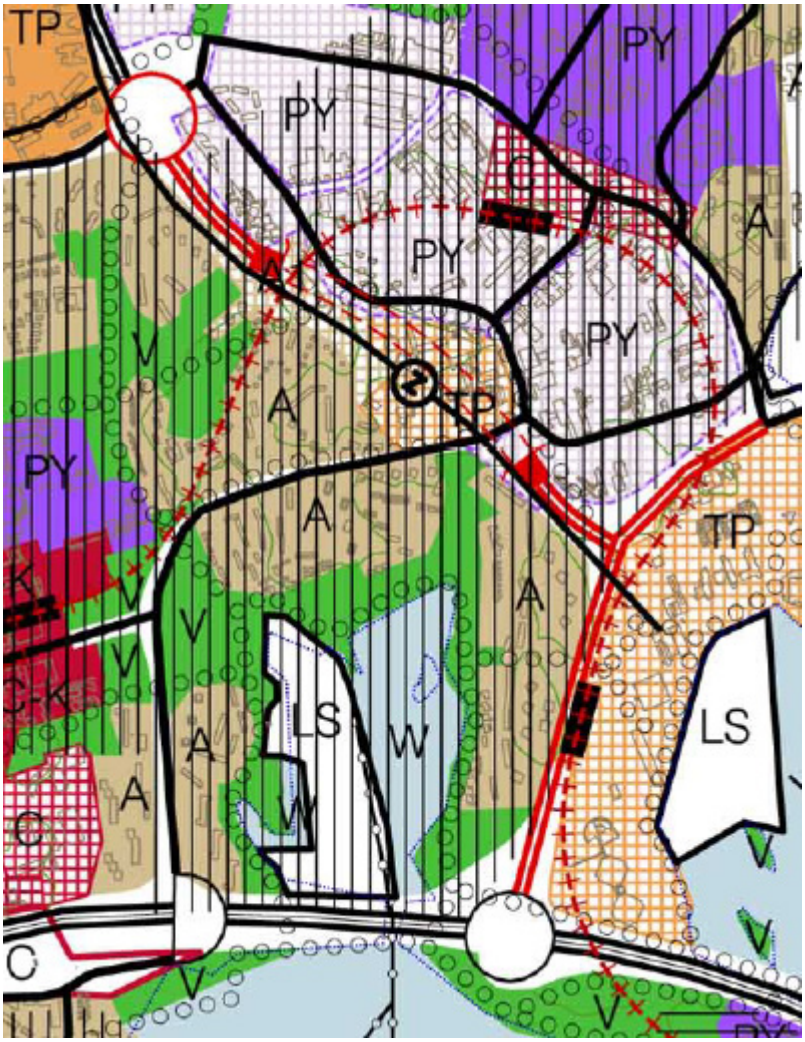


Figure 10: The Otaniemi-Tapiola-Keilaniemi area in the master plan for the southern parts of Espoo (City of Espoo 2015a). Western metro line and three stations are on the map. Ring Road I is in tunnel at Hagalundinkallio. The Keilaniemi section of the road has been drawn with red, which means the road section is to be "significantly improved", permitting also tunnel building. Tapiola center is at the left edge of the extraction.

The expert interviews that were conducted shed light on the turn of events around 2005 and 2006 (page 34). They mention a strategic paper, the Otaniemi vision, which was initiated and prepared at this time. In the visioning paper the importance of the area as a business and technology hub was further discussed. The vision states that the Hagalund tunnel plays a key role in connecting Otaniemi to Tapiola. It also notes down the "long tunnel" until the Länsiväylä road which would in the long term enable building residential housing and offices between Tapiola Itäranta area and the Keilalahti bay. (City of Espoo 2006a; 2007a)

The shift in the Hagalund-Keilaniemi planning brought about a pause in the formal decision-making process, since the next meeting concerning specifically the planning of Ring Road I tunnel took place in 2008. The pause may have been due to the impending master plan approval for the southern parts of the City of Espoo.

On the 7th of April 2008 Espoo accepted the new master plan for the areas covering also Tapiola, Otaniemi and Keilaniemi. (City of Espoo 2015a) Under the new master plan the area in question is developed as an urban area for housing, work places and services and administration. The master plan of 2008, which still is in force as of end of year 2015, retains Ring Road I in the Hagalundinkallio area in a tunnel, but does not yet outright locate the road in tunnel on the Karhusaarentie stretch in Keilaniemi. It does, however, indicate the Karhusaarentie section on Ring Road I to be "significantly improved".

On 7th May 2008 the Espoo City Planning Board was again dealing with the proposal for a new local detailed plan in Hagalundinkallio (City of Espoo 2008b). The new permitted building volume was now 77 150 floor square meters, counting an increase in permitted building volume from the proposal handled in 2004 and 2005 of 5000 – 12 000 floor square meters. However, according to the meeting minutes, given the changed exact planning area, there occurred a reduction of 25 400 floor square meters compared to the previous planning phase. In the minutes it was said that the planning was done in coordination with the road plan prepared for the Ring Road I. The proposal notes that putting the road into a tunnel reduces the noise and emissions levels in the area.

On 7th of May 2008 in the City Planning Board meeting, however, and again on the 28th May 2008 meeting, the planning board tabled the decision of approving the new local detailed plan proposal for Hagalundinkallio (City of Espoo 2008b; 2008c). In the 4th of June 2008 meeting (City of Espoo 2008d) the Planning Board decided instead there will be organized a planning competition for the urban design and planning for the area, so that Otaniemi and Tapiola will be connected to another. The Planning Board decided in the meeting as well that a general plan of the Ring Road I tunnel in the whole area between Maarinsolmu, Länsiväylä and the Lehtisaari bridge would be needed. (City of Espoo 2008d) This plan would take into account how the partial covering of Ring Road I in Karhusaarentie in Keilaniemi would enable the Otaniemi-Keilaniemi-Tapiola area to become functionally and landscape-wise a much more united area. In the decision text of the meeting it was noted that, when dealing with the master plan proposal, the planning board had already refrained from planning an excavated rock tunnel in the Keilaniemi part of the ring road.

The planning competition for the Hagalundinkallio area was resolved on 25th March 2009 (City of Espoo 2009b). The jury unanimously decided to give the first place to the proposal called "Kaksoisviivan maa". In the minutes the City Planning Board, when accepting the proposal, noted that the local detailed plan area is linked to the tunnel work of Ring Road I and the forthcoming area reservation plan. These plans would include for example the exit route from the tunnel when coming from north to the Tapiolantie street. This seems to be the last time for a while that a Hagalundinkallio area residential and office development plan is discussed in a meeting of Espoo City Council, City Board or the City Planning Board.

Figure 11: The winning Hagalundinkallio competition plan, "Kaksoisviivan maa" (Arkkitehtitoimisto A-Konsultit Oy 2009). The Tapiola garden city is on left and Otaniemi on the right.

The Hagalundinkallio tunnel on the other hand is discussed later on, in the City Planning Board meeting on 13th April 2011 (City of Espoo 2011a). Based on plans that the Planning Board required especially in 2008, the city of Espoo had prepared a project plan, including area reservation plans, for the areas in Keilaniemi, Hagalundinkallio and Maarinsolmu. In the minutes text both the tunnels, Keilaniementunneli and Hagalundintunneli, are discussed. The text notifies that a park deck

connecting Keilaniemi and Tapiola would enable significant infill development in Keilaniemi. It also states that the Ring Road I in the section of Hagalundintie between Kalevalantie and Tapiolantie would be built under a concrete deck cover, instead of an excavated rock tunnel, that until this point were the basis for the tunnel development in Hagalundinkallio.

The Espoo City Board's Division for Business and Competitiveness discussed the development of the Tapiola-Otaniemi-Keilaniemi area in its meeting on 16th May 2011 (City of Espoo 2011b). In the meeting minutes it is noted that the decision of abandoning the excavated rock tunnel option in Hagalund was influenced by the higher than previously assessed risks, and the fact that it was not possible to arrange an entry from the Ring Road I to the Tapiolantie street in the rock tunnel option. The Business and Competitiveness division argued that well-functioning transportation network necessitates that there is a connection from the Ring Road to Tapiolantie (see figure 9, page 20). In the City Board's division's meeting minutes it is noted that the solution for developing the surroundings of the Hagalundintunneli is in principal similar to that of the development of the Keilaniementunneli environment, only considerably more complicated. The assessed risks of the rock tunnel, nor the reasoning behind the Hagalundinkallio area development as more complicated, were not further specified in the minutes text.

The change from a rock tunnel to the concrete deck option can be seen as an incremental adaptation, since it does not feature a radical move from the original goals and objectives of the road planning. The progression of the Hagalundintunneli, though, is halted here, to be realized after serious consideration and after the Keilaniemi development project has been initiated.

Figure 12: The metro extension from Ruoholahti to Matinkylä (Länsimetro Oy 2015a).

In conjunction with the creation and planning of the tunnel and other road transport options in Keilaniemi-Otaniemi-Tapiola area, there occurred the development for the Länsimetro, or Western Metro, and its stations. Länsimetro is an extension of the current Helsinki metro line to Espoo in the west. The City Council of Espoo decided on carrying out constructing the metro line on 25th September 2006 (City of Espoo 2006; Oksanen 2006). The metro extends from Ruoholahti in Helsinki, which is its current western end point, first to Lauttasaari in Helsinki and then on to Keilaniemi, Otaniemi (the Aalto university station), Tapiola and eventually to Matinkylä (see figure

12, page 24). The metro line will be extended further until Kivenlahti in the western Espoo (YLE Helsinki 2014). The western metro to Matinkylä is scheduled to open in 2016, and it very much affects urban design, transportation and real estate development of the southern Espoo.

The Espoo City Planning Board suggested already on 13th of June 2007 and the Espoo City Board in turn on 18th June 2007 that the Keilaniemi metro station would be planned on the following principles (City of Espoo 2007b). The station locates itself between the Karhusaarentie and Keilaniementie streets so that the covering of Karhusaarentie with a deck and infill development would become possible. The planning board at this point stated that high-rise residential buildings are possible in the area, but require nevertheless careful planning and placing. Also a good connection from the metro station to the residential quartiers of Itäranta was needed. These general rules also steered the later project planning of the Keilaniemi road tunnel.

The Espoo City Board (City of Espoo 2008a) reserved the Keilaniemi metro station area in January 2008 for the SRV Viitoset company in order to build there an area for residential high-rise buildings (the then Tapiola Towers). The minutes from the City Planning Board in November 2008 notes also that planning for area design had already been started (City of Espoo 2008e). It seems that reserving the planning area for SRV may have helped in shifting the emphasis from Hagalundinkallio to the Keilaniemi area. The forthcoming metro development in Keilaniemi called for, and also made possible, some attractive residential development near the metro line.

The Planning Board, in November 2008, on its behalf accepted the proposal for the underground detailed plan for the metro tunnel and station in Keilaniemi (City of Espoo 2008e). It specified that the park-and-ride system at the metro station would be decided when the above-ground detailed plan is accepted. The planning board stated that the number of park-and-ride places is determined by the metro project plan. Also, in the above-ground local detailed plan it would be specified which park-and-ride places would need to be constructed before the Länsimetro subway starts running. These decisions seem to have had ramifications until the still upcoming completion of the Länsimetro line and the Keilaniemi station in 2016, together with the expected residential towers. Accepting the above-ground detailed plan for the towers and also the Ring Road I tunnel would in this case have to be made before the metro completion. The City Council of Espoo accepted the underground detailed plan for the western metro line and the Keilaniemi station on 19th January 2009 (City of Espoo 2009a).

Demonstrated by the planning documentation from the 1990's onwards, there is no clear moment of initiation for the Hagalund and Keilaniemi tunnels and the respective residential and office development. Consequently, there is not exact starting point where assessment of alternatives and their benefits like systems analysis as depicted by Priemus (2008) should have taken place. One such potential moment could have been in June 2008, when the City Planning Board, alongside with launching the Hagalund planning competition, required a general plan for the whole road area between the Kalevalantie street and the Länsiväylä road to be drafted. In the records certainly cannot be found all of the alternatives that have been discussed in the Espoo planning. The official documents, however, show by and large the treading of the preceding path, and give no hint other than aiming to connect the three neighbourhoods of Otaniemi, Tapiola and Keilaniemi by putting the roads in tunnel.

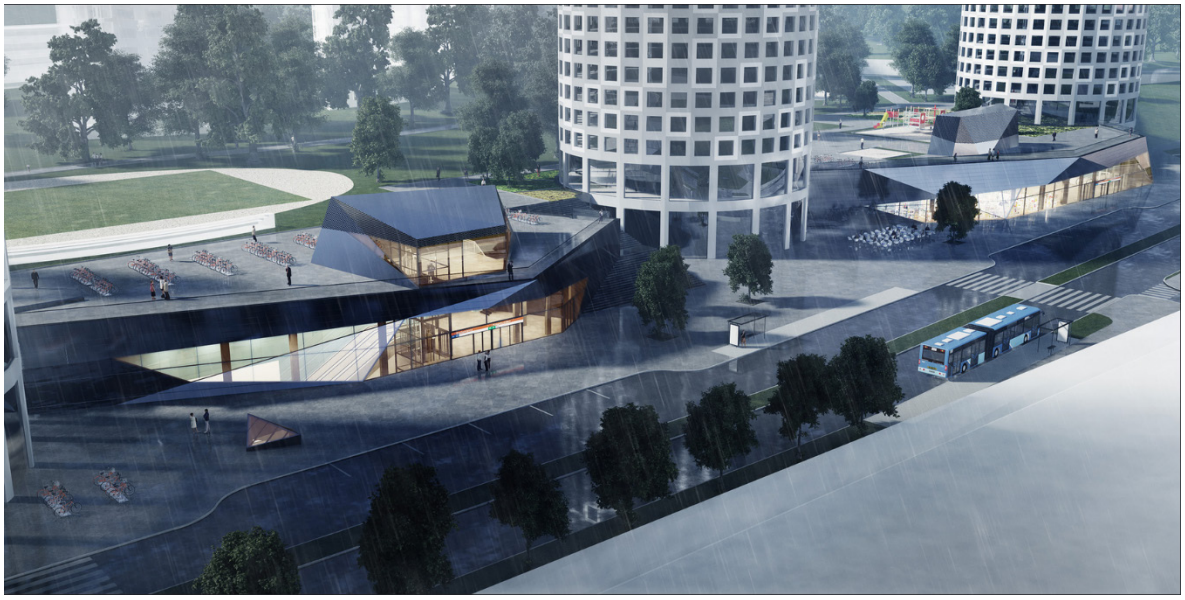


Figure 13: An illustration of the Keilaniemi metro station, the Keilaniementie street, parts of the residential towers and the deck covering Ring Road I (Länsimetro 2012).

4.3 Accepting the detailed plan for the Keilaniemi car tunnel

The Espoo City Planning Board dealt with the proposal for the detailed plan alteration in Keilaniemi the first time on 22nd April 2009 (City of Espoo 2009c). The proposal included infill development next to the Keilaniemi metro station and the covering by deck of Ring Road I. Land had been reserved for the SRV Viitoset Oy (currently SRV Yhtiöt Oyj) construction company since 14th January 2008 in order to build residential high-rise buildings in the place (City of Espoo 2008a). The minutes text from the planning board meeting cite the national land use guidelines, upon which one has to promote community and urban structure that is based on mass transit, especially rail transit, giving them as a justification for the residential towers development. Any significant construction, according to the national land use guidelines, would have to be made in areas that is serviced by mass transit and especially rail-oriented transit, as the Keilaniemi area will be by the western metro. The dimensions of the use of land would, according to the guidelines, have to be such that the operational preconditions and utilization of public transport are improved, and infill development would need to be scheduled so that a possibility for using public transport is secured (Ministry of the Environment 2015).

The City Planning Board minutes from April 2009 (City of Espoo 2009c) found that the proposed above-ground Keilaniemi detailed plan is intimately connected to the already accepted underground detailed plan for the Länsimetro extension. At this point there was talk of four high-rise residential towers, each having 31 floors in height. The planning board added to the decision that it needed to be investigated to raise or lower the building heights by 10 floors. It was also emphasized at this point that the deck above the tunnel would be carried out as a parklike solution that gives good connections for pedestrian and bicycle access. There would be a two-floor base building for the residential towers, whose roof cover acts like a courtyard and connects with the Ring Road I deck. Parking facilities would be found in the two-floor base building and would also be made possible two stories underground. It was expressed in the meeting minutes that the four residential towers would be round-shaped.

The minutes text state that by covering the Karhusaarentie section by a deck, traffic noise and emissions can be reduced so that the area becomes suitable for residential development. Once the metro starts operating, it was noted, the local bus transit system starts acting as feeder lines to the

metro line. The Espoo City Planning Board (City of Espoo 2009c) minutes text states that the local transit connections improve by this decision. The minutes expresses that private car park-and-ride facilities would have places for from 100 to 150 cars. Those parking places would be made in connection to the parking facilities of the residential towers. At this point it was estimated that the new permitted building volume would be 79 600 floor square meters, giving a block ratio of 4,7.

Then two years later on 13th April 2011 the City Planning Board accepted the area reservation plan for the Keilaniemi area, in addition to accepting the principle of continuing the development of the Hagalundinkallio section based on a concrete deck cover over the Hagalundintie road. (City of Espoo 2011a)

The Espoo City Planning Board in Espoo has for example (City of Espoo 2011c) again voted for lowering the height of the proposed towers by 10 floors, although without accepting this proposal. The reducing of height was suggested because of the supposedly harmful visual effects for the surrounding landscape at large, and because the height of the buildings would differ from the rest of the buildings near the area. When the new local detailed plan was being processed by the City Board on 26th of March 2012 (City of Espoo 2012d), the same alteration of building height with 10 floors was suggested for the same reasons, again to no avail.

Figure 14: Shadow lengths of the four proposed residential towers (Arkkitehtitoimisto SARC Oy 2010). The study on shadow lengths was done to warrant that the tower shadows do not disturb nearby residential areas. Picture above depicts the midsummer situation when the shadow lengths are at their shortest.

The new detailed plan came for approval to the City Council on its meeting on 21st May 2012 (City of Espoo 2012f). The preceding city council meeting had tabled the decision. In this meeting it was again suggested that the buildings' heights should be lowered, this time to the height of the Fortum office tower, at the moment the highest building in the area. A new suggestion was made for the transportation system principles, that of turning the Ring Road I on Karhusaarentie to an urban boulevard, which could have residential and office buildings on its side. These combined suggestions

were voted down with 49 against 16 votes. It was also suggested that the whole detailed plan proposal be turned down, which was also voted for and not accepted.

The urban boulevard proposal represents a kind of radical adaptation (Giezen, Bertolini and Salet 2015) that has the capacity to alter both the expenses and the benefits of the development, aiding the implementation of area development and producing considerable financial benefits to the City of Espoo. For this capacity it is assessed later in the text. It can be seen, though, that at the time of approving the local detailed plan considerable amount of resources had been invested in making the local detailed plan for Keilaniemi. This likely created path dependence whose contravention would have required a much more extensive external impact. The financial hardship that the plan still faced later in planning, which is handled in the interview analysis part in section 5, come to be no such reason. The accepted plan was adopted with controversy, which is not surprising for a large land use and transportation endeavour.

Figure 15: Ring Road I road design according to the road general plan (City of Espoo and Uusimaa ELY Center 2012).

In the same meeting with the plan approval the city council accepted the so-called letter of intent for the change of the road (City of Espoo 2012e). The resulting tunnel would be approximately 500 meters long, and is based on the current location of Ring Road I in Karhusaarentie. Ring Road I would have 2 + 2 lanes in general, in the tunnel 3 + 3 lanes. Sizing of the road would be such that the speed limit on Ring Road I in Keilaniemi would be 60 km/ h. The intersection of Karhusaarentie and Keilaniementie would have a grade-separated roundabout, as well as would the intersection of Karhusaarentie and Hagalundintie. These fly-over junctions are designed to ensure fluent traffic flow.

In the meeting it was decided that the City Council still has to separately decide on starting building the Ring Road I tunnel (City of Espoo 2012e). The city council also decided that the decision to build can be made, when the council has been introduced the principles by which the construction can be done with funds received from selling the plots for the residential buildings. This means that building the tunnel should be financed entirely by the profit received from the land development. The Council stressed that the decision aims to minimize the risks that could occur for the city. The requirement of being able to obtain the needed capital from plot sale has had profound impact on the eventual development solution, as will be seen in the following section 5.

By the time of approving the tunnel and towers detailed plan, however, things had started to stir in the Espoo city politics. A council question was presented on April 30th 2013 by 21 council members (City of Espoo 2013a). In this question the inquirers referred to the council decision of covering the costs of the Ring Road tunnel development by the sales revenues occurring from the plot development. It was inquired 1) what the situation was of the negotiations designed to ensure that the decision that the City Council made on 21st May 2012 would hold, and 2) what the schedule of the tunneling of Ring Road I was at the time.

An answer was prepared, and also accepted by the council in the meeting in June 2013, that discusses the development project from a primarily administrative point of view (City of Espoo 2013a). The answer depicts for example, that since Ring Road I is a state-owned road, two official plans are required; the so-called general plan and a more detailed road construction plan once the general plan is accepted. The state authority Finnish Transport Agency accepted the general plan on 30th April 2013, but there had since been made an administrative court complaint about the plan acceptance. The detailed road plan could be accepted only once the complaints were sorted out.

According to the answer to the council decision (City of Espoo 2013a), building the four high-rise residential towers and expanding the Ring Road I could start respectively only when there is a binding road construction plan in place. The other requirement for construction, the detailed plan for the area, was already accepted and came to be legally binding after a Supreme Administrative Court decision on 31st October 2013 (Uusimaa ELY Center, City of Espoo and Finnish Transport Agency 2015; Länsiväylä 2013). It was also noted in the answer to the council question in June 2013 (City of Espoo 2013a), that the city of Espoo and the SRV Yhtiöt company were negotiating about turning over the building plots, and that the city also was making research on the possible models for covering the construction costs. The meeting minutes does not reveal more about this research or the negotiations between the city and the SRV company. It was estimated at this time that the City Council would be presented a proposal of the principles of the tunnel development in spring 2014. The answer to the council question prepared by the city estimated that the construction works could start in fall 2014, and argued that there were no such points of view in sight that the estimation presented to the council in May 2012 of the feasibility of the enterprise should be weakened.

A later council initiative presented by 30 Espoo City Council members in 2014 (City of Espoo 2014d, 2014f) paid attention to the contract with the state, and that Espoo is slated to pay for managing the road when it is finished. The council members suspected that Espoo is not going to receive the sum needed to pay for the construction from selling the plots for towers. They referred to the budget cuts in Espoo that year and that a certain rigour should be applied to the costs of development in Keilaniemi as well. In the initiative it was suggested that the said contract should be opened and the financial burden for Espoo should be lessened. The answer to the initiative pointed to the incremental adaptations made to the plan and that is should still be realistic to fund the development with the land sale returns.

On 25th September 2013 the Espoo City Planning Board accepted some theses and policy alignments for the development of the Keilaniemi and Otaniemi areas (City of Espoo 2013b). It was, for instance, stated that measures will be promoted that advance public transit utilization rate in the Otaniemi-Tapiola-Keilaniemi area. These are made along with the new western metro line development. The emphasis of the planning board decision laid heavily on integrating and connecting to one another the activities of science, innovation, culture and business taking place in the area. The Jokeri tram line and the so-called Science tram line would be made an integral part of the transportation system in the whole area.

Another council question by the city council members took place on the 21st October 2013, made by 29 council representatives (City of Espoo 2014a). This council question also referred to the expected costs of the tunnel development for Ring Road I, and the decision that the development costs would be covered by the revenues received from the land use fees. It also refers to the fact that the state has declined on participating on the development costs of the road expansion and also has declined covering the yearly operating costs of the tunnel infrastructure (Uusimaa ELY Center, City of Espoo and Finnish Transport Agency 2015).

The second council question may in part have taken place since the then Director of the Technical Department in Espoo, Olavi Louko, had expressed in the Helsingin Sanomat newspaper on 9th October 2013 (Laita 2013), that the cost estimate for the tunnel development was in fact 200 million euros, instead of 120 million euros, a figure appearing in the official documents in the time of approving the local detailed plan in 2012. Louko also expressed that the real estate investors could not be relied on covering the tunnel construction expenses, leaving the financial burden of the development to lay on the shoulders of the city. The council members saw that the city would take the burden against the former decisions made by the Council. The council members referred to the tight financial situation of the city, and urged the city to put the development plans on hold until the traffic management situation on Ring Road I necessitates the development.

In the official answer that was prepared for the 21st October 2013 question, the City Board expressed that the increasing demands by state had raised the road reform costs to 130 million euros (City of Espoo 2014a). The board meeting minutes text does not explain the statement of the 200 million euros expenses by Olavi Louko. The prepared answer to the Council also stated this to mean that financing the project cannot be realized with selling land at the area. For this reason the state and the city had initiated a process where the parties sought for a more cost-effective solution. The city had an aim to prepare a solution for implementing the Ring Road and residential towers plan, which the council would receive for approval in the beginning of the year 2015. It was also noted that there were some critical blasting works to be made before the western metro line would start operating. The City Council when handling the answer tabled it in its meeting on 19th May 2014.

On 9th June 2014 the City Council sent back the answer to the council question for further preparation (City of Espoo 2014b). This decision came by votes 38 against 33. In Finnish local politics this kind of returning for further development has a potential for quite a drastic change in a specific question. Hereby the City Council intended that the city investigates two options: the original tunnel option where the expenses incurred by the development would be significantly lowered, and another option which abandons the tunnel development outright and aims to convert the Ring Road I into a city street and bring new development on the side of the street. The City Council would need to be given the alternative building volumes and costs estimates for the two options.

In the expert interviews in the spring 2015, this returning for preparation of the council question was brought up with one respondent. It was noted that a measure such as a council question is not as significant as the sturdy and legally binding decision that the Council makes, such as the local detailed plans or the budget decisions. Regardless, in a normal course of events it is expected that the Council would get the required estimates for the both alternatives.

The Espoo City Council addressed the Keilaniemi tunnel and towers plan eventually on December 7th 2015 (City of Espoo 2015h), to set in motion the construction works that needed to be done before the metro starts operating. Those excavation and blasting works would take longer to be carried out and cost more if they were done the same time the metro operates. The tight financial situation of

Espoo perhaps manifested in the meeting, for the city council representatives widely expressed reservations for the plan. A certain shortcoming on part of preparation for the meeting was that the Council in fact was not presented the contractual arrangements with which the expenses to develop Ring Road I could be covered with the plot sales proceeds. The City Council members felt sufficiently uncertain of the endeavour, and sent the proposal back to preparation to the City Board.

In the meeting of the 7th of December 2015 the Espoo City Council (City of Espoo 2015h) was not provided the comparative cost estimate calculations of the city street alternative. The requirement for alternative calculations was brought up by some council members in the meeting. The presenting city official explained in the meeting that the preparing officials had acted according to the current local detailed plan for Keilaniemi. The Espoo City Board addressed the project again on the 14th December (City of Espoo 2015i), having in sight of sending the project back to the council which could accept it already in December to start the construction works. This time the City Board were presented with considerably more material, like the contractual arrangements that in November (City of Espoo 2015g) had been in the hands of the City Board Division for Business and Competitiveness.

The Espoo City Board (City of Espoo 2015i), though, and consequently neither the City Council in its meeting, was not presented the cost estimates of alternative street-side development. The meeting text again justifies the omission of calculations by the alternative not being in accordance with the local detailed plan accepted in 2012. However, the City Council, when it decided on making the comparison in 2014 (City of Espoo 2014b), did not require implementation of any certain alternative, but instead the estimates of costs and amounts of development for the two alternatives. In principle, it is the role of the City Council to decide on the local detailed planning in Espoo, making the City Council the right venue to assess any prospective development alternatives. Another justification for not making the alternative city street estimates, according to the City Board meeting text, is that it would not be possible to plan a pleasant and healthy living environment between Ring Road I and the Keilaniementie street.

On 21st December 2015 the Espoo City Council (City of Espoo 2015j) decided to start the construction works of the tunnel and the towers in Keilaniemi. The decision came to be by 48 votes against 25. The Council also required follow-up reports on the costs and the schedule of building the road and the road maintenance costs. It also emphasized the importance of fluency of traffic during construction and the need to take care of the details of the pedestrian and bicycle connections.

In some sense the planning process has come to resemble a project marked by power and rationalization as depicted by Flyvbjerg in his study on Aarhus city center reform plan in the 1970s and 1980s (Flyvbjerg 1998). When the Espoo city planning did not make estimations for even a required alternative for Keilaniemi, it exercised considerable power in the issue over the City Council. Planning for one option and discarding any other that was brought forth during the planning process is also an exemplar of strong path dependence in place in planning (Pierson 2000).

In this thesis the main focus is to assess the planning for Keilaniemi and the alternative development proposals. According to the systems analysis method (Priemus 2008), it is the interest of the society in general to create and evaluate alternatives, ensuring choosing the most beneficial one. It will be also of interest how the transportation system alternatives proposed would affect the overall functionality and accessibility in the city.

4.4 An alternative to the Ring Road I tunnel and residential towers plan

As described in the preceding section, the tunnel and the high-rise buildings plan has faced considerable objection in Espoo for its actual implementation. Based on the City Council, City

Board and the City Planning Board meetings' minutes, the opposition often rests upon the financial feasibility of the project. The council question that was presented on 30th April 2013 and answered to on 10th June 2013 (City of Espoo 2013a) dealt with the City Council's decision that the Ring Road I replacement expenses should be covered with the sales revenues resulting from the development. The question posed on the 21st October 2013 and handled eventually the 9th June 2014 (City of Espoo 2014b), and also the council initiative in the end of 2014 (City of Espoo 2014f) had the same concern as previously; that the costs of the road expansion were higher than what could be gotten back from the development.

Here it is evident that at least some kinds of adaptations were in order in Keilaniemi to implement the project. Either the costs needed to be reduced by incremental adaptations (Giezen, Bertolini and Salet 2015), or the project priorities and objectives changed so that it would become realizable. An obstacle in making changes is the path dependent nature of large infrastructure projects and institutional settings; they are geared towards carried out the plan as it is (Pierson 2000). This is understandable as considerable amount of resources and thinking was put to the planning of the road and towers project.

Although not given serious consideration within the Espoo City Planning Center, it had been proposed already in the course of approving the local detailed plan for the area on 21st May 2012 that no tunnel should be made, and that the future development should take place next to a state-road-turned-into-city-street Karhusaarentie. This idea was furthered when the City Council decided to alter the response for the second council question in 2014. In the decision the Council necessitated that two options should be looked upon: one of reducing the tunnel development costs and the other of examining what kinds of amounts of buildings rights and with what expenses could be established in Keilaniemi should the state road be turned into a city street. (City of Espoo 2014b)

The proposition of making the Ring Road I section on Karhusaarentie into a street is not a completely new one. Lamuela Orta (2010) in his master's thesis work looked into turning the Karhusaarentie road in Keilaniemi into a boulevard, as part of a wider boulevardization of the Länsiväylä road between Espoo and Helsinki. This work is so far the most extensive study on the possible city street scheme of the Ring Road I section in Keilaniemi.

Looking into the possible motives for the alternative proposition one also has to take into account the on-going master plan work that the City of Helsinki has embarked upon. Helsinki in practice aims to boulevardize its incoming freeways, for example the Länsiväylä road until its border with the City of Espoo between Koivusaari and Hanasaari (see figures 12 and 27).

According to the Helsinki master plan website, the city boulevards enable the expansion of the downtown area (Lintula 2014): "[D]ense neighbourhoods that continue the traditional city block structure will be built along the motorways turned into boulevards." According to the City of Helsinki plans, a third of the detailed plan reserves will be on the side of the city boulevards and in their vicinity. Helsinki is of the opinion that its downtown is the heart of business activity, and at the same time an alluring place for living. For the sake of productivity more space near the core downtown area is needed for the companies, and more homes in order to meet the increased demand for urban living environment.

Helsinki thinks that turning the highway-like areas that separate the city structure, and inhibit the expansion of its core areas, into an urban city environment in terms of both transportation and land use would provide those premises. Helsinki, Espoo and Vantaa effectively function as

one city as the Helsinki Metropolitan Area (HMA), with people and workplaces moving across the border. In the coming decades Keilaniemi also is likely to become, for the evolution and densification of both Espoo and Helsinki, part of the fringe of the larger downtown within the metropolitan area.

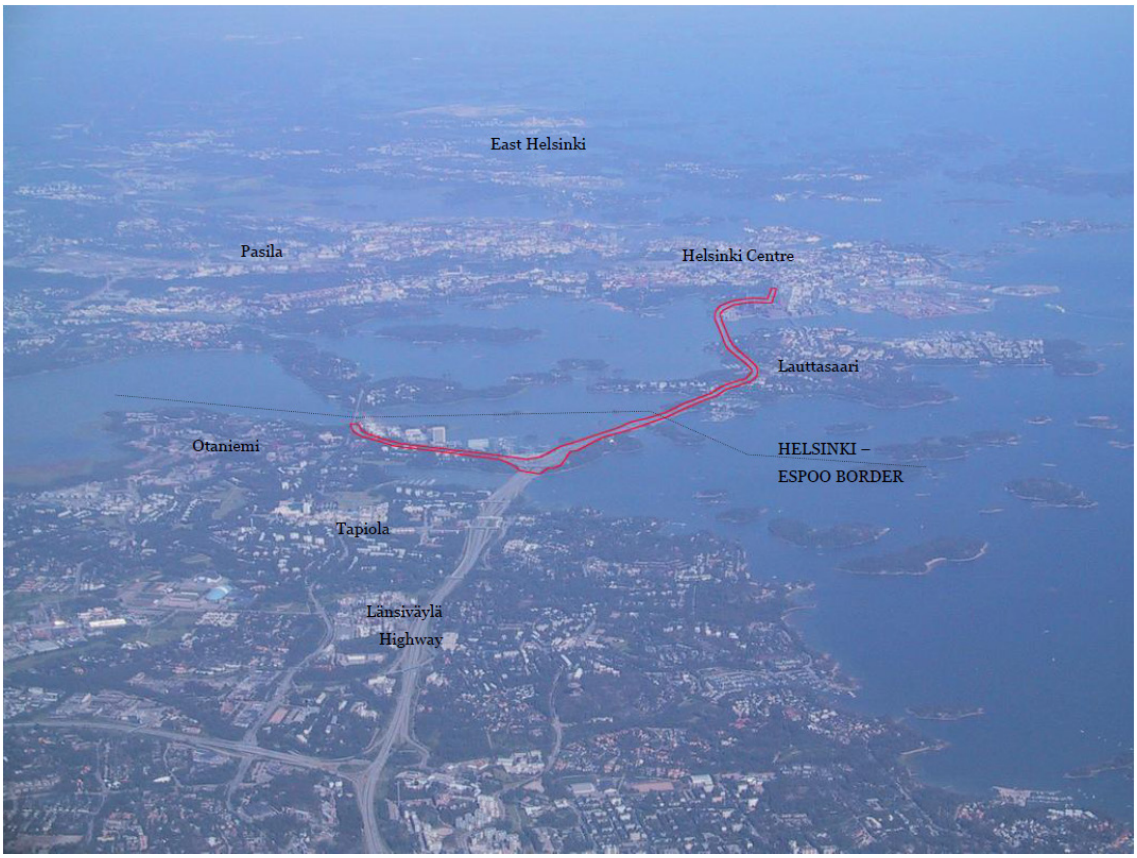


Figure 16: Aerial view of eastern Espoo and Helsinki city center (Lamuela Orta 2010). The marked red road area is Lamuela Orta's project area. Ring Road I on Karhusaarentie is the road patch near Otaniemi and Tapiola.

Lamuela Orta (2010) reflects these developments in his master's thesis. His proposal has the sides of the Karhusaarentie street built up, introducing development in the areas which otherwise would be prohibited to be built on due to noise and emission regulations. Building next to the car lanes is enabled due to lower traffic speeds. The total area covered by the roadway system would be greatly reduced compared to the tunnel proposal and also from the existing traffic environment.

A comparison between the building volumes of the current local detailed plan in Keilaniemi and the Lamuela Orta sketch can be found in Appendix 3. It should be noted that the Lamuela Orta's street option deals with a larger area than is covered by the actual Keilaniemi detailed plan tunnel option. There are, however, considerable differences between these. It may be estimated that the permitted building volume is at least two, most likely three times as big in the boulevard as in the Ring Road I tunnel option. In fact only a small portion of the building volume in the Lamuela Orta proposal is where it would not otherwise be affected by the Ring Road I road tunnel and intersection development. Lamuela Orta reports (2010, 85) 182 000 floor square meters of office space and 110 000 square meters of additional residential floor space in the area. There are also six, instead of four, residential towers in place, which is achievable near a boulevard, but not on the interchanges in the traffic area south from the Ring Road I tunnel mouth (see e.g. figure 22, page 48).

Figure 17: Karhusaarentie boulevard plan in the Lamuela Orta (2010, 67) thesis. In the sketch the traffic protection zones are built, and there are six towers instead of four.

Figure 18: Karhusaarentie boulevard sketch of Lamuela Orta (2010) in an aerial picture.

A price for one square meters of permitted building volume in the Helsinki Metropolitan Area can be held for instance at 630 euros per m² (Peltola 2014, 365). The exact value of one permitted floor square meter for building is not relevant for the following comparison. It is for example known that the City of Espoo will get at least 48 million euros for selling plots for two of the towers in Keilaniemi (City of Espoo 2015i).

The accepted Espoo detailed plan building results in earnings worth 57 million euros, for the permitted 90 400 floor square meters. If looking at the Lamuela Orta plan, and assuming triple the building volume to the current solutions, the earnings from selling the building rights could reach 171 million euros. On the expenses side, developing the entire road tunnel in Keilaniemi costs by the recent City of Espoo estimate 93 million euros. Assuming the about one kilometre stretch of Karhusaarentie road maybe takes about 20 million euros to convert into a street, one could present the two alternatives in financial terms as follows:

Figure 19: A rough estimate of the compared costs and benefits of the Ring Road I tunnel and the city boulevard alternatives.

	Building rights value for the city	Road development costs	In total
The tunnel alternative	57,0 million €	93 million €	- 36,0 million €
The street alternative	170,9 million €	20 million €	150,9 million €

It is interesting to note that the conditions for near-by accessibility and for walking and cycling may not be affected in the boulevardization option, and in fact may be improved. The Ring Road I grade-separated intersections and the road would have considerable barrier-effects for the non-motorized traffic, which is not stressed in the reports prepared for the Espoo City detailed plan in Keilaniemi. Even though it indeed may be relatively pleasant to walk and use a bike on top of a road deck, the intersection areas north and south of the deck cover still block large areas from cycling and walking (see e.g. figure 21, page 44).

The city street alternative proposed by the Espoo City Council representatives may also refer to at least partly different kind of concern over the tunnel and towers plan. In Helsinki the boulevardization is considered for its possibilities for urbanizing the city. It is probable that a city street would provide a more urban, agreeable and more accessible residential area also for Keilaniemi. Possible alternatives for development are concerned here, in order to invest some thought to the alternatives not investigated. The kind of alternative such as turning Ring Road I in Keilaniemi into a city boulevard is, in hindsight, a planning alternative that an application of systems analysis approach in an early stage of planning could have generated (ref. Priemus 2008). Therefore there is a motive of discussing the implications of the alternatives, and also look at what the alternate development does mean in terms of transportation accessibility, which is done in the end of the following interview analysis section.

5 INTERVIEW ANALYSIS FOR THE KEILANIEMI CASE

5.1 The initiation of the development project for tunnel and towers in Keilaniemi

As retrieved in the interviews, one of the catalysts of the current development plan in Keilaniemi may have taken place in the year 2007 when the then Project Manager for the Tapiola area Lauri Niemi witnessed a Espoo City Council meeting. Minutes from this council meeting have been searched from the city archives, but a specific meeting date and meeting minutes could not be identified. In the council meeting a resolution had been made which stated that Espoo should take advantage of the city's seaside location in its housing development. The SRV construction company's interviewed expert K[1] (see Appendix 1 for further information on the interviews) recalls Niemi the following day mentioning the resolution during a negotiation meeting, and that Niemi had made a small map exercise determining possible places for such development. The result was that Keilaniemi could be such a place, and that the new housing would be achieved by lowering the level of Ring Road and covering it with a deck, thus obtaining building space.

The Espoo shoreline is to a considerable extent already used for housing and recreational purposes. According to SRV's expert K, in Keilaniemi came together the seaside and a good, central location. It seems that with a deck it was possible to extend the existing Itäranta residential area in Tapiola in the west towards Keilaniemi. In 2007 – 2008 when the development plan was initiated, Finland and Espoo still lived an economic upturn. According to K, the advantageous central areas in South-East Espoo, Tapiola, Westend, Haukilahti and Mankkaa, were popular and well-respected areas on a scale of Espoo and the whole HMA. At that time, the infill development for Tapiola was not yet even on its way, so demand for housing in the area was expected.

Out from the people interviewed, some had hands-on knowledge about the planning of Keilaniemi and its tunnel schemes since the 1990's. Expert D, architect from the A-Konsultit architect office, recalls that Keilaniemi had been subject to dozens of assignments since that time. Ring Road I had been roofed in the Hagalund area already at least in the general land use plan for Otaniemi that A-Konsultit had made in 1994 (A-Konsultit arkkitehtitoimisto, LT-Konsultit and Arkkitehdit Paunila & Rautamäki 1994). According to D, Architect Professor Kai Wartiainen had proposed the Apila model that then evolved into the T3-concept, which aimed to connect the three neighbourhoods of Tapiola, Otaniemi and Keilaniemi. In the then Apila model (Arkkitehtitoiminta Kai Wartiainen Oy 1996), three roads plunged underground where the intersections also would have been, out of sight. This model, which existed before the new phase of planning started, was dropped when planning for Keilaniemi became primary in the late 2000's. According to expert G from the Ramboll road consultants, a previous plan was immature. It was also very expensive, and it was seen as heavy. The modern requirements for the quality of building road tunnels likely also played a role in discarding the early model.

The recollections of K and D confirm what has been apparent based on the planning documents and elected bodies meeting minutes, that reducing the harmful effects of traffic and obtaining places for building self-evidently has been sought with covering roads with decks. It becomes quite apparent that, despite possibly some contrary developments, any concept as the boulevardization option today promoted in the Helsinki master plan proposal has not been present as a serious alternative.

[1] The interviewed experts have been anonymized here.

As SRV's K states, a kind of basic insight already at the beginning of planning for them was that the towers will be located on the side of the road, and that the road be covered with a deck. Building next to state-owned highway environment without a deck was implicitly out of the question, due to health and safety considerations. From the expenses of covering the ring road resulted also an objective for a certain number of floor square meters to be built. It does not arise from the interviews, but it is likely that SRV with its consultants have been aware of the visioning plans that had been made for Keilaniemi and the Ring Road I previously (expert K):

> "First of all, there's one big, a certain big thing was that – I say a basic insight since the beginning was that these towers are not on top of that deck, but on its side. Because you cannot, you maybe get six or seven floors on top of that deck sensibly. Make that relative to the structures. So the starting point was that the traffic is covered with deck and the towers are on the side. And then this, at the time let's say when we started working on this, we had a certain concept; we calculated roughly how much the tunneling costs. We were able to estimate how much building rights we should have in that area so that you can make the financial equation work. So you got a certain objective for floor space, and then we pondered with the architect on how the sought floor space should be implemented so that you could make that deck."

The amount of development was essentially dictated from the start by how much building would offset the tunnel development costs. The Otaniemi vision work in 2006 and 2007 (City of Espoo 2006a; 2007a) was another starting point for the planning of Keilaniemi that came up during the interviews. The Espoo Planning Board within the City Council had initiated visioning work for the development of the larger Otaniemi area. At the time, as depicted in section 4, the city's view was in detailed planning for the Hagalund area. According to expert F, though, the planning was in the making with no clarified purpose and aim:

> "We had a topical issue of tunneling in Otaniemi above all at the water tower. A local detailed plan was in the process of making at the Hagalund hill area at the water tower. I then asked --- what the purpose [of the plan] was, what was the [Espoo city planning] office aiming for, before we start with the details, because they were sketches then. And when the answer was something like we could build houses here, so (laughs a bit) we said that is a wrong answer. The board needed to have, we are not making a detailed plan just so that we can build, what are we actually doing with them? That's when we started making the Otaniemi vision. --- In this examination we started with functional questions, what is TKK [Aalto university at the time], what is VTT, those were the main agents here. What is the aim of those and the city of Espoo, and there we also studied the overall connection to Keilaniemi. Well actually since then it started to take shape in quite a concrete way what is needed in Keilaniemi. And then our objective that the board vocalized in discussions was that concrete aim that Keilaniemi also has to be changed, so that it is not just workplace area, but a multifunctional hybrid, and above all to bring people to live there. So that the area would function and live more efficiently than just at the office hours."

This depiction sheds light on the time when the city started to plan particularly for Keilaniemi instead of aiming for connecting Otaniemi and Tapiola first. The vision work laid an emphasis on the whole Otaniemi-Tapiola-Keilaniemi area and urged to shape Keilaniemi into a more diverse area. Otaniemi vision also coincided with the preparation of the master plan for the southern parts of Espoo that was achieved in 2008 (City of Espoo 2015a). In the Otaniemi vision, according to Planning Board representative expert F, a larger role of the Otaniemi area within Finland and globally was under scrutiny. What was, and is still, aimed after was that Otaniemi is a leading environment for innovation and a trendsetter. The vision, as well as the strategy accepted by the council saw that science, innovation, business and living should come together in the area. According to F, Otaniemi is

fundamental for the business activity in the area, but all the businesses cannot be fitted just inside Otaniemi. The entire environment in Otaniemi, but in Tapiola and Keilaniemi too, according to the aims of the City of Espoo, should be attractive and enjoyable to cultivate the whole. The functionality of Keilaniemi was stressed and Otaniemi and Keilaniemi were needed to be weaved together, and the barrier-effect of the ring road eliminated.

The Espoo City Planning Board embarked on asking some questions about the purpose of the development in the Hagalund area. Among those were: what is the problem now and what is it likely to be in the future, and who is affected by the problem. Asking these purposely is in fact as is the beginning of a systems analysis process (Priemus 2008). In this regard, the shift in view from providing houses on Hagalundinkallio to the overall development of the area could also have been a stage where providing alternatives for planning could have taken place.

Priemus (2008, 107) stresses in the conceptualizing of systems analysis, that an infrastructure project is at best a solution. There should thus be one or more problems to which an infrastructure project would be the most expedient response. The problem itself within the Otaniemi-Tapiola-Keilaniemi area is one of cohesion and liveability. The Otaniemi vision by and large proposed one answer to the question of problems. Comparing to implementation of systems analysis proper, what probably lacked was the systematic creation of alternatives and their prudent measuring.

In order to build immediately next a motorway two things are basically possible; either covering the road and thus reducing the harmful effects of the traffic, or then downgrading the road in such a way that building next to it in a street-like manner is possible. Another option yet is to build somewhere else, or not to build at all. Doing nothing however means forgoing at least two main objectives, or problems; those of integrating the area better to a whole and introducing new residential development in Keilaniemi and next to the metro station.

SRV or the Espoo city planners seem not to have considered an alternative solution of reducing the road width and speeds. At a first glance this seems natural and understandable. The general practice of managing the state roads or even the city streets in the Helsinki Metropolitan Area has not been one of reducing their size and vehicle capacity. Still, the propositions of boulevardization are not entirely foreign for Finnish planning. In a public event that handled the Helsinki master plan boulevardization proposal that took place in May 2015, the event facilitator and retired land use planner Pentti Murole recalled himself having proposed boulevardization of the radial Helsinki main roads in 1991. According to Murole the proposal was outright rejected at the time, though.

It seems that the solution of turning a main road in urban structure to a more urban street-like environment has been in the realm of the unknowables, situation in which an event, or in this case an alternative, cannot even be imagined (Bertolini 2007, p. 1998). Carlos Lamuela (Lamuela Orta 2010) sketched a boulevardization of the Länsiväylä motorway in Lauttasaari, Helsinki, and the section of the Ring Road I in Keilaniemi only in 2010, well after the initiation of the Keilaniemi planning. The Lamuela proposal received quite a lot of notice after its publication (Hamilo 2011; Laita 2015; Yle Helsinki 2011; Murole 2014), and may have contributed to the discussion that led to City of Helsinki adopting it for its new master plan proposal.

Over the course of planning Keilaniemi has become a more natural place for both office spaces and homes than the location on the Hagalundinkallio hill in the views of planners and stakeholders. The city had made a decision in 2008 of building a western metro line that would have its station among others in Otaniemi at the university main building and in Keilaniemi. In the interviews it is depicted that the houses at Hagalund would just have been apartments for someone. In Keilaniemi, the housing

would support and is supported by the Keilaniemi business environment. The houses would be nearer the core areas of the T3-area, or what at the moment of this writing is called the Espoo Innovation Garden. The aim of the Espoo Planning Board was and is to bring people near and build more downtown-like centers at the metro stations.

When visioning for the role of Otaniemi, the road planners at the time still considered the Hagalund area primary. In a closer planning though it was conceived that tunneling the road in Hagalund and covering the road with a deck would be too expensive. At the same time the gaze had already turned on to Keilaniemi, and planning for it began. Out of several interested construction companies, as depicted by expert F, the views of SRV seemed the most advanced:

> "At the same we noted that Keilaniemi would actually be a natural place for residential purpose as regards the aim [of tunnelling and connecting the areas]. So what if we started the tunneling process there. And so we started to make more detailed plans. And at that time SRV and some others, there were several construction companies who stated their interest, but the preparedness of SRV was the most advanced from the city's point of view, and they also committed themselves to the most ambitious aims that matched with the view of the board and the City Board. And then we have these usual planning reservations. It is a division of the City Board that makes them, so a contract was made between SRV and the city that we start to explore significant residential development which would be connected to tunneling Ring Road I. That is how the towers started to be developed. So a significant number of residents, and at that time Espoo had made a decision of extending the metro here, so they would be in the immediate vicinity of the metro station."

Many aims converged at the time of the metro decision and the southern parts of Espoo partial master plan. However, it seems that SRV was at the right place at the right time with its seaside-location high-rise residential development aims. It can be seen, from systems analysis point of view, that by inclusion of the construction companies no other alternatives for the goal of introducing residential development and connecting the area were brought to discussion. On the contrary, the views of SRV supported the tunneling scheme of the Espoo city planners, and Espoo chose the SRV plans according to their preferences, which still likely only enforced the chosen planning vision, also increasing returns on the chosen path.

SRV brought forth SARC Architects as architect office for the planning of towers, and Ramboll Finland as main consultant for road planning. Because of the forthcoming metro and the workplace-intensive nature of Keilaniemi, the aim was to introduce a residential development element that was agreeable and functional regarding the city structure. According to SARC representative J, towers were planned because they wanted the new development to have a strong identity, which high-rise residential buildings would have and which also would be in agreement with the existing tower-like office development in Keilaniemi: "The idea was specifically to emphasize the landscape and views, both directions. In addition for very good views for the residents, these towers hamper very little themselves and create open views to all the directions."

SRV got a planning reservation for the tunnel and towers in January 2008, which was since then extended annually until late 2015 (City of Espoo 2014e). From the start, based on the interviews, it's clear that the Keilaniemi tunnel and towers plan was an investor-led endeavour. It is worth assessing briefly the role of investor-led development that might be more usual within the planning policy of the city of Espoo than elsewhere.

5.2 The role of investors in advancing the planning in Espoo

The interviewees were of the opinion that the residential towers would not have gotten as far as they are, were it not for the perseverance and patience of the construction company SRV. This view was shared by several people involved in the process:

> Interviewer: "You said the land belongs to the city where the towers are, is that right?" Expert H: "Yes." Interviewer: "It is so that planning reservation has been given to SRV here." H: "That is true. It is, it's, now you have here that kind of procedure, that SRV has in a way developed this idea. And it is based on this – in Espoo you have a lot of that, that there are areas where some private party comes up with something, and then you make a planning reservation and there you go. But in any case you have to sell the plot market price. You get the price from the plot in full to city, compared to if it were private land where you could only get some of its value."

> Expert N: "I have to say that, it is so that SRV, and then they have a consultant which is the SARC architect office, who has been planning these towers, so in a way they have had a very strong sort of will. --- In a way they also accept that there are all kinds of things [in the process], but they have had a strong will to advance this. I'd say with some more hesitant developer, you wouldn't have, this would probably have been stuck many times (makes a small laugh)."

> Expert B: "--- SRV has been very active here. They want- have had the plot reservation since, was it already, is it 2008 or is it, supposedly they have made sketches already before that. That is as far as I understand the reason this Keilaniemi has appeared feasible… it's mainly economic."

A relationship between private developers and the city in the planning process was not something that was intentionally brought up or asked about in the interviews. Some interviewees commented on the nature of planning in Espoo to be more investor-led than elsewhere, compared to for example in Helsinki. They did not see this as something intrinsically bad, but depicted it as a nature of the planning process.

A reason for the characteristically develop-oriented type of planning is that the City of Espoo does not own very much of the land within its borders. Another reason may be a lack of planning resources with the city, something which was also referred to in the interviews. If planning is seen from the position of the City of Espoo, it makes sense for them to put their resources to development that is more likely to materialize, and this at least should be the situation in projects that have been initiated by a private developer. They also get help in planning for that. As was also noted by SRV's executive K, the company has supplemented the planning with their resources.

Not addressed during the interviews, but the tenacity of SRV, and willingness to postpone starting with building the towers, may be the general financial development and other large-scale undertakings of SRV, like the Kalasatama center where the construction works started in spring 2015, and several projects in Russia (Herrala 2015).

In various aspects during the interviews, it was referred to how the situation in Espoo and Keilaniemi compares to that in Helsinki. Regarding one aspect an interviewee pointed out that Espoo does not have, unlike Helsinki so far has had, large undeveloped areas where they could operate more freely. In this view, there have been more possibilities to make actual city planning in Helsinki: "Planning is inevitably more like a technical matter [in Espoo], it is to a considerable extent based on land-owners [wishes], what they want to do, what the city is aiming to do there and so on. These are diverse

projects where planning is one important part. But it is not such that someone makes city planning proper, it is hard to start doing that here."

On one occasion the emphasis of investors and developers in planning was expressly criticized, although the person also acknowledged its advantages:

> Expert E: "So maybe what I hope, I think it's good that we cooperate with different stakeholders, they have some ready initiatives there. It is after all a way with which we get… so I don't disparage that method of planning, but in Espoo you have a lot of this kind of purely project-led planning. So maybe we should more begin with what we need ourselves and then only bring the partners into project. I think you see it here that in a way all the possibilities have not been investigated when you have embarked on that project. It is with only one kind of precondition. But then again you have these new promising initiatives, like Kera, where the city in earnest thinks what it wants to achieve. Sure, the land-owners there, they have the plans drawn up, in case a partial master plan be drawn, but they too are ready to adjust according to what the city wants. And it's this… a clearer view [should be got] of where you put things and what you do, and then maybe sometimes think about alternatives. But certainly it shouldn't be belittled, if someone is willing to carry out a proposal that lines up with the interests of the city, so of course. We too have at times had quite a big lack of resources in planning. And certainly, as long as you sort of get -"

Project-led planning of course does not embody the kind planning where the problem is brought up along with the solution. When taking up private developers initiatives, it is the solution that is necessarily first presented. In this kind of planning several alternatives are not naturally created and weighed, as they would in application of systems analysis. The view of expert E represents a suggestion towards the kind of assessment of alternatives that systems analysis in planning would entail (Priemus 2008). In the Keilaniemi planning case it also looks as if the Espoo city planners were of like mind on the project, which helped its advancement.

Development plan for tunnel and towers in Keilaniemi should be assessed in light of what is realizable by the city. It may be that without the ambition and resources of SRV, the project would have stuck. The kind of plan SRV initiated also made the tunnel and the towers contingent upon each other. Would there have been new development without the initiative of a private developer? Perhaps other institutional or planning arrangements would have needed to be considered. It is an open question whether there would have been alternatives when it comes to planning new residential development at the metro station in Keilaniemi. As such, however, the planning did not face any inertia at the time of its initiation and could progress forward.

5.3 Pros and cons of the development plan in Keilaniemi

What did the interviewed specialists think about the Keilaniemi plan? As written out in the list of interview questions (Appendix 2), the interviewees were asked about the possible up-sides and down-sides of the tunnel and the towers proposal. Asking about just pros and cons produces essentially diverse assessments on a very general level. More specific views and conceptions are analysed in further chapters. In this subsection some more general impressions are focused on.

First of all, the plan was praised by making possible the introduction of new residential development in Keilaniemi, which was sometimes seen as mandatory. This is the most widely shared advantage of the plan. Many interviewees considered the Länsimetro development in Espoo, and saw that the station in Keilaniemi should be put into use. One participant considered covering the road and introducing houses at the metro station as a good addition when the decision of building the metro

line had been made. The tunnel on the other hand, as it was considered, was seen by the interviewees as the only possibility to carry out the new residential development:

> Expert H: "I think in a certain way there is a good logic in here. There's going to be a metro station in Keilaniemi, Keilaniemi is exclusively business area. And the kind of metro station where there are only work places is never a good metro station. On the other hand there on the other side of Ring Road I the Tapiola Itäranta area is so sparsely populated, if you think about a metro station, it's so scantily built that it doesn't actually support the metro station at all. So this is in a way a crafty way to get settlements there next to the metro station. And to definitely have it, you need towers. And when you place the towers like they are now, you don't have to get many floors up when you have sea almost in all directions. So the big picture is not bad at all."
>
> Expert N: "It is a bold venture in a way. I think the fact that you get inhabitants partly in Keilaniemi is an awfully good thing, and you get residential development to the metro station. There is no way actually to place that there, if it wasn't for this kind of huge plan, to cover the traffic area, because it would be completely unworkable solution regarding noise and air quality and I think immediate neighbourhood already. If you didn't cover the traffic tunnel, I think how you would use the developed area between Ring Road I and the Keilaniementie road would be some office or business quarters, offices for which the traffic harm wouldn't be so…"
>
> Expert A: "Briefly my view is that it is quite smart. OK, when it's not for me… - I don't address the financial arrangement if that is in that way smart - Let's put it this way, when we will have the metro and a metro station, and the metro investment is roughly one billion or actually two until Kivenlahti, so in that place that kind of station, if you wouldn't have the towers, it would mostly be this kind of a working place station which would be little used on week-ends. --- And the covering, if you think about that, it is of course I think maybe a necessity, I think it's the only way to get the noise levels and the air pollution under control. I would guess if you didn't do that, you wouldn't even get a permission to build those towers there."
>
> Expert C: "--- you can build towers there on top, and maybe developing the Ring Road I in Keilaniemi should be seen as a question of land use. It's hard to imagine that you could build residential houses, residential towers here next to the road, if the traffic noise and pollution stay the same as they are now. So that kind of covering there is justified. It is of course expensive, but the benefits would be large. And you have to remember that a metro station is going to be built there in Keilaniemi. So in that way too it is an excellent place for this kind of densifying of land use."

In an interview with SRV's representative K it was asked separately whether for example an alternative of introducing dense downtown-like blocks was considered. This seemed not to be the case. According to K, a slab block house that would have the same amount of floor square meters that the towers have would be four hundred meters long and twenty-one stories high. In this way, to definitely have residential development with the tunnel plan, one needs towers.

The view of the planners that covering the ring road with a deck is the only way to mitigate the harmful effects of traffic, can be seen to represent a city planning paradigm where the capacity and fluency of traffic is held primary and urban land use and transportation functionally separate from each other. Noise and air pollution are kept in control by building away from the road area or behind protective structures. Should the whole capacity and traffic speeds be reduced, though, Keilaniemi would be able to provide more space for residential development around its thoroughfare. With tunnel the workable area for residential development is forcibly smaller.

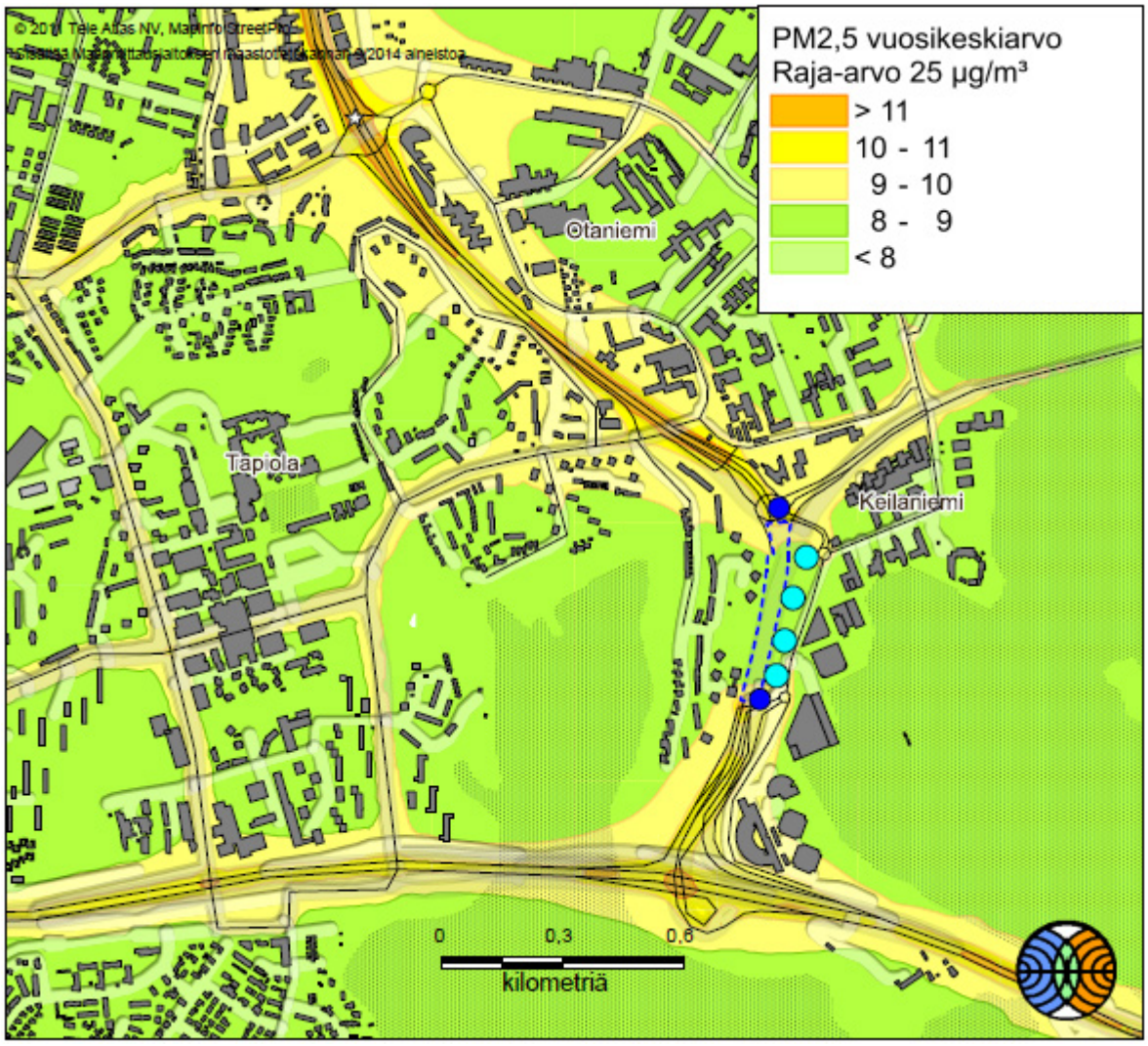


Figure 20: Expected air quality in Keilaniemi in 2035 according to the Keilaniemi tunnel plan (City of Espoo 2015b). The map shows the highest concentration of small particles compared to the yearly limit, according to the Euro 3 discharge level.

The living conditions of the Itäranta settlement west from the Ring Road I road were addressed extensively during the planning phase. Levels of noise caused by traffic in the future were projected in studies and visual effects of the towers were considered in reports. It was seen that the effects during the construction would be considerable for the area. The necessity to build a concrete deck cover on Ring Road I brings about an advantage of improving the situation in Itäranta; blocking the ring road would lower the noise and pollution levels compared to the current situation. The deck would also give a better connection to and from Keilaniemi and the metro station. It was generally seen that the advantages from the development for the Itäranta area are bigger than the possible blocking of views caused by the towers.

The plan for Ring Road I involves lowering the position of the road, which is now built on a bank. This potentially would help better connect the neighbouring areas and improve the quality of the environment. One participant was of the opinion that this kind of version of development would be better for the environment by any standard.

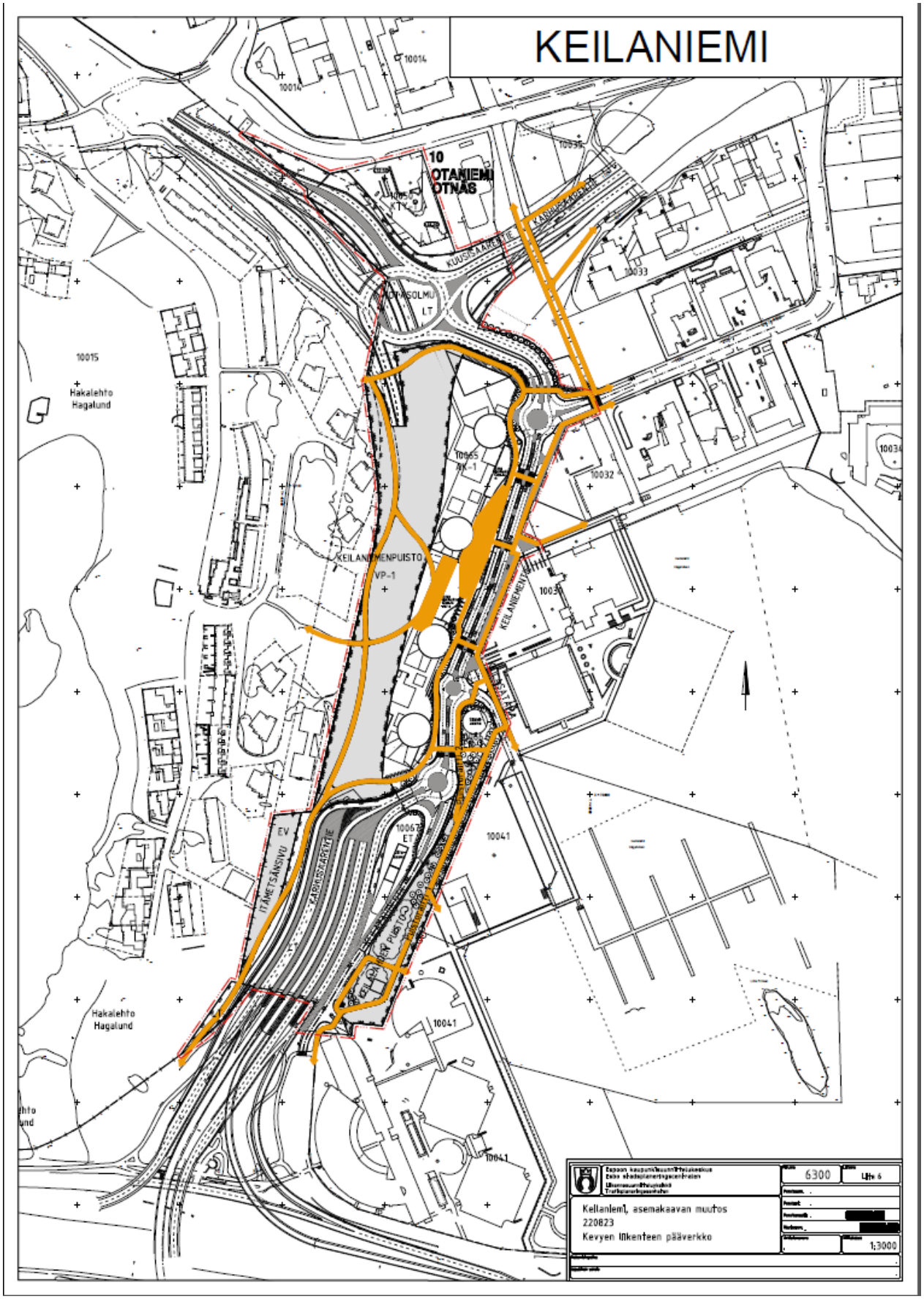


Figure 21: Access by foot and bicycle in the Keilaniemi project plan (City of Espoo 2012b). The local detailed plan area is marked with dashed red line.

SARC Architects' expert J stressed the fact that the vertical difference between the Keilaniemi road and the Itäranta area, which is built on a ridge, is actually very big. The deck cover and the base building of the towers would help to address the difference. This in fact may mean a smoother ride for those using bicycles and other non-motorized travel to cross the road area to Tapiola. The base building of towers at the metro station also gives a possibility to locate parking quite easily between the road in the tunnel and the metro station and the Keilaniementie road.

The planning in the vicinity of the tunnel is reasonably dense, according to the interviews, due to the height of the towers. According SARC's representative J, the towers themselves area very narrow. This is in order to achieve a tower-like impression. The towers have in the vision eleven apartments per floor, three lifts, and statutorily two staircases, which is imposed by legal constraints for buildings of that height. One would be able to get to the metro floor by elevator. Because of safety regulations and challenges for building high the apartments are more expensive than usual. With great views in a central location on top of a metro station, SRV's interview participant K assesses the market risk for selling the apartments worth to be taken. The towers, as written out in the detailed plan, will be round-shaped, though other shapes were also considered during planning. The shape was not initially dictated by SRV, but construed by the architect office. Round towers also permit more light than angular buildings would, and interfere comparatively little with the views from Itäranta.

The shape of the towers and their heights and exact location were studied and thought about a lot during the planning phase. These kinds of considerations are part of the incremental adaptations that are common for basically all the planning and easy to do.

It was seen, probably rightly so, that the area in the south-east of Espoo is not likely to diminish in importance and complexity. This is the general justification for making good land use in the area: "Surely this neighbourhood, all this area in Southern Espoo along the metro line, it's not going to constrict. More likely there is going to be all the more building."

It was by and large considered in the interviews that the situation for walking and bicycling ameliorates a lot. It was referred to how easy it would be to go between the Keilaniemi metro station and the Itäranta residential area and Tapiola. The advantages of the tunnel and towers plan for pedestrian and bicycle access were in fact largely stressed also in all of the planning documents available. All participants, however, did not entirely share this view. Interviewed expert N addressed the walking and cycling conditions as follows:

> "… and then surely, so if you think about walking and cycling, so.. It is fairly easy to get under Ring Road I in many places nowadays too. Actually we discussed that a lot, that this deck does not improve the connections as such. It just makes them a lot more pleasant and agreeable to use, when you are there in the park, and don't use any underpasses."

Walking and cycling conditions should be considered in entirety when addressing moving about in Keilaniemi, Otaniemi and Tapiola. Conditions for going a straight way between Keilaniemi and Tapiola are improved. It seems to be overlooked that the large intersections and the several lanes required in the plan make a barrier effect for the pedestrian use and cycling. Despite the deck, though, these decrease the so-called immediate accessibility in the Otaniemi-Tapiola-Keilaniemi area and hamper with achieving the goals of bringing the whole area together. As it is, reflecting the latter quote on the matter, the deck does not actually add to the general flexibility of navigating the area of the three neighbourhoods. This view was also shared by one other participant, E, during the interview rounds:

> "--- in a way the tunnel solves problems for the cityscape at this spot. But the problem makes them worse at either end of the tunnel. Additionally there is going to be an extra access ramp from Länsiväylä, likewise a two-deck round-about, which both are, which add to the barrier effect caused by the roads, especially in a situation where we would like to increase the connection between Otaniemi and Keilaniemi and on the other hand between Tapiola, Otaniemi and Keilaniemi."

Connecting the three adjacent areas of Otaniemi, Tapiola and Keilaniemi had been a goal of land use planning since the early years of Keilaniemi tunnel planning (City of Espoo 1999; City of Espoo 2002; SCC Viatek Oy, A-Konsultit Oy and LT-Konsultit Oy 2003; City of Espoo 2011d; City of Espoo and Uusimaa ELY Center 2012). Over the years the extent of coverage of the deck has reduced. The technical and financial challenges have eventually resulted in plan that does not very much reduce the barrier-effect of Ring Road I near Keilaniemi.

As a general impression of the Keilaniemi land use, all participants were not enchanted by the plan. Negative appraisals were not shared by many participants, but at least one interviewed expert did not see the plan as advantageous in that regard. The focus here is mainly on the tower cityscape:

> "Well I think it was of course like a slap in the face if you think of the landscape. But you shouldn't put this anywhere in the text. --- and in some way it feels that this doesn't create any immediate surroundings, doesn't create any cityscape, doesn't create anything. And I think it doesn't create that kind of city front or water front, it's like sculptured play on a bigger scale."

5.4 Difficulties during the planning process in Keilaniemi

The local detailed planning that enables constructing both the residential towers and the Ring Road I tunnel in Keilaniemi culminated in May 2012 when the detailed plan was approved by the Espoo City Council (City of Espoo 2012f). According to Espoo architect N, when the project was initiated, the planners were already aware that there would be a lot of trouble mixing road planning and detailed planning for real estate development. This reflects the nature of the Keilaniemi project as a complex large-scale project.

Interviewed N estimates that it took a year to come up with a workable solution for the actual place of the road and the road area, and the residents of Itäranta complained of the road coming too close to their houses. At one point it seemed as if it was needed to cut away some of the visible rock base near some of the northern Itäranta houses. Some members of the Espoo Planning Board were, during the planning phase, against building as high as it was proposed. Hence it was conceived that buildings of different heights should be studied (City of Espoo 2009c). This resulted in the towers being of different heights in the final plan. It was also decided that there would be four towers instead of three. The exact positions of the towers were examined closely as well, for example from long-distance viewpoints.

The planning phase of the Keilaniemi project demonstrates some common characteristics for land use planning in general. As evidenced by the interviewed experts, planning faced an apparent moment of stagnation or otherwise called inertia, taking time for one year for finding a workable solution for the exact place of the road. A different solution also was found for the construction phase arrangements, avoiding cutting the rock close to existing houses. These and the other solutions represent incremental adaptations, solutions that stay within the boundaries of current procedures, and do not have an impact on the main goals, purpose or the design or route of the project (Giezen, Bertolini and Salet 2015, 1003 – 1004).

A lot of work and planning has been put to both the transportation considerations and planning for the deck and towers. The required studies and accounts have been made into a considerable detail during planning. These studies comprise for example the project plan (City of Espoo 2011d), the environmental impact assessment (EIA) (City of Espoo and Pöyry Finland Oy 2011) and the general plan (City of Espoo and Uusimaa ELY Center 2012) which is required in Finland for plans that require also EIA (Highways act 503/2005). They are also studies for the service structure in the area (Arkkitehtitoimisto SARC Oy and SRV Oy 2012), the air quality in the region (Finnish Meteorological Institute 2011), windiness and micro climate (Arkkitehtitoimisto Kimmo Kuismanen 2009), noise impacts (Ramboll Finland Oy 2010), park-and-ride solutions (Sito Oy 2008), area reservation plan for the road (City of Espoo and Ramboll Finland Oy 2011), neighbourhood and block planning study (Maisema-arkkitehdit Byman & Ruokonen Oy, Arkkitehtitoimisto SARC Oy and SRV Oy 2011) and for example a study of the history of building of Keilaniemi (Arkkitehtitoimisto SARC Oy 2011). Many additional studies considering especially the towers, their position, shape and shadows caused by them, have also been made.

It seems that the planning for Keilaniemi has been done meticulously, and certain incremental adaptations made to the design of infrastructure in the Keilaniemi plan have been successful and beneficial ones. The participants in general commended the result both in terms of land use and transportation plans.

For the developer an essential risk in a project is whether apartments would sell once they are finished. SRV has for example been presenting the prospective apartments to potential payers with simulators. According to some of the interviewees, there has been very big interest for them.

For the SRV executive K the direst places during the process were the filed complaints to the administrative court, later dismissed, and which did not receive appeal permits from the supreme administrative court. One of the reasons for doing all the necessary studies to fulfil the plan is obviously a wish of all the stakeholders to avert delays caused by complaints to courts. During the planning phase the road position was moved somewhat toward east, and solutions were found where the occupied road area during the construction does not go too close to the Itäranta area. Even though some of the Itäranta residents continued complaining after the changes were made, these or other complaints did not eventually pose a need for more radical changes, in the form of so-called radical adaptations (Giezen, Bertolini and Salet 2015). These would have been such changes where the main goals, mission or the preferred design of the road and the deck would have been changed. According to expert F, the whole Espoo Planning Board was also ultimately satisfied with the found solutions. In an interview N from the Espoo planning office told that the eventual plan was very well accepted by Planning Board, Espoo City Board and in City Council.

Figure 22: Street map of Keilaniemi (City of Espoo 2012c).

Difficulties for the process of developing the plan can be seen to result from combining road planning and land use planning. Especially demanding concerning the project as a whole was seen road planning. Espoo Project Manager who has acted as buyer for the road planning on behalf of the City of Espoo, characterized that since 2009 the process has taken almost half of the working hours. Road planning operated in a relatively enclosed space and with essentially limited resources. According to the road construction consultant Ramboll's project manager, expert G, the challenges arise especially from large-scale motorway planning:

> "This is challenging, challenging in many ways, because you have to combine with the goals of city planning. Road construction engineering, highway engineering, we are there next to a motorway. And I think the tunnel, it is still challenging in our country. I have been involved in several tunnel projects, and I know the challenge, and especially this kind of building on top of a tunnel is a challenge."

Road planning questions have complicated all of the planning. For example expert J from the SARC Architect office, who have been responsible for planning for the towers, said in the interview: "Of course this has been, how would I say it, a tremendously laborious project. And maybe the part of transport planning has particularly been unforeseeably big. So in a way, we started to solve this question where we knew some pressure was involved in solving it." On the other hand, it was understood that finding good solutions takes time and requires effort, or how participant H put it:

> "One shouldn't wonder how many years it took before it began. Sometimes it's so that when you face some setbacks, the solution gets developed further, it's always – it is now better than it was before, and it is always a good thing to face some adversities and get to justify and spur things and to make changes. That's how it is."

The theoretical framework in this study deals with adaptive planning and a systems analysis approach in the start of a large scale infrastructure project. It is paramount that the association of stakeholders involved in the planning and realization of an infrastructure project demonstrate a capacity for adaptation, instead of rigidity. In some instances, like in the quote above, capacity for adaption could be well detected in the attitudes of the interviewees. Also, it was for example suggested that more emphasis should be given to the initial stages of a project, to analyse the alternatives for solving the planning problem. The following interview extract from representative F fair and square represents the kind of idea for planning for large projects that is a systems analysis approach (Priemus 2008):

> "Let's put it this way, in city planning, and all the more in the future, I support that we should do more this kind of examination always at the beginning of a project. Use still more, time and also money, so that we make, not only this kind of idea plan, but taking ideas and putting some of them in a closer scrutiny and calculation. So that there, when we put a proposal on display, and above all when there is a local detailed plan, so you should get to the implementation. Now this time span that these [projects] often have, it is vast. And of course here, it has come from the expenses of tunnelling and others, and this prolonged general economic situation."

The Keilaniemi project ended up making rather large adaptions for the implementation of the plan. These changes in plans are presented in the section 5.8., "Reducing the road construction costs and phasing the development". These changes concern the elevation of the road and phasing the road and towers development. Adaptations were also made with the adjoining Tapiolantie street intersection. All these adaptations are incremental in nature, which means that they do not present radical changes in the overall goals and objectives decided early on in Keilaniemi planning.

Covering a road with a deck is not the easiest way to develop city, in a characterization of one of the interviewees. It involves considerable safety concerns and complex systems. It was being referred also to that the contractual stipulations have been difficult. It is a challenge to find provisions which would not constrain the implementation too much.

Ring Road I is a state-owned road, where the state finally has a say in road development and the required planning decisions. It was agreed, in an early stage, though, that Espoo would be responsible for the development costs, as it also reaps the benefits from the available building rights. The Espoo decision-makers were concerned of the costs for the tunnel and road building, which resulted in planning the whole project to be realized in stages. The problem of who pays and who is entitled to decide on specific solutions regarding road planning will be addressed especially in section 5.7.

Timetable of planning and construction is determined by the specific concern of launching the western metro line traffic in the fall 2016. According to one planner, "the timetable has been all the time a cause of anxiety; we have been terribly busy all the time." Additionally, without metro in sight the planning might have taken even longer, whereas now there has been target to work towards. The tight schedule possibly has increased the willingness of the involved parties to negotiate and arrive to solutions regarding open questions.

At their time the metro line and the stations needed local detailed plans as well, so the studies involved in metro planning schedule have naturally been bound to land use at least to some extent. Also specifically, in terms of the metro inauguration it would pay off to make some of the towers foundation work before the 2016 time limit; unless the blasting operations would need to be scheduled for evenings when the metro is not moving, which would cost extra time and money. The process of construction for the road will be a complicated one where the Ring Road I traffic first moves onto the plots of the towers while tunnel is being made. After, the traffic moves on top of or in the tunnel itself so that works for the towers may begin.

5.5 Building on top of a tunnel with a deck cover

Building on top of a deck cover is a theme that surfaced during the interviews, even though questions regarding it were not planned or generally asked about. In public discussion alone, when talking about the problems that big thoroughfares are causing and with a need to find new places to build in, it is often suggested that putting a road into a tunnel and building on top of that might be a solution. Ring Road I is about to be put in a tunnel in Keilaniemi, though no buildings are going to be built on the deck cover. While seemingly a good idea, building on top of a tunnel holds many problems.

Main concern in putting a motorway in any kind of tunnel, which by and large is also the general issue in Keilaniemi, is that it costs a lot. At its core, the Keilaniemi planning case is about the high costs of building deck cover on a large road. Tunnel structures have to be sturdy when building on top of them. Considerable safety measures for the tunnel system are required even without any real estate development on the top. The backdrop behind the requirements is that a tunnel roof should support an unlikely explosion of for example a gas truck, as one interviewee described it. This may be an issue on Ring Road I, since trucks and lorries coming from the Western Harbour in Helsinki often drive Ring Road I.

Planning for safety and tunnel structures is usually laborious. The tunnels need constant monitoring when in use, so they require establishing complex tunnel management systems. A challenge in building tunnels is that during construction traffic usually has to be directed around the actual construction work area. This complicates the building process and its planning, compelling it towards

several work stages. The arrangements during construction add to the financial burden and slow down construction.

In public discussion about tunnel safety it is sometimes referred to that EU directives require very robust tunnel structures from tunnels exceeding the length of 500 metres. This was echoed also by for example one of the study participants. However, according to Espoo project manager B, the Keilaniemi tunnel would be 460 metres in length. According to B, the safety measures are not different from those tunnels that are more than five hundred meters long:

> "Well it's about five hundred meters, so if you compare it to some directive, that tunnel directive, it has been handled as a tunnel of half a kilometer, which requires all the possible accessories. --- It's not anything like a tunnel four hundred and ninety meters long wouldn't require, that the situation would somehow change. You have here in a way – and also traffic volume and the surroundings have to be taken into account. It's not that simple. This is less than 500 meters, but you have there all the gadgets that you can think of."

There is no circumventing the safety issues, but still of course a question might be asked whether the needed structures would possibly be lighter to make the development less costly. This was not, however, a question that was examined during the study, so it may not be answered here.

It was expressed in one interview that building tunnels might not be a good way to achieve building plots, because the space the road area takes weakens building possibilities: "You do not necessarily get with that what you want, especially when the massive structures at the tunnel mouths are taken into account. --- Even though this deck increases the green area there, the availability of building places diminishes, and it is just the size of the tower, which a bit increases that [the amount of development]" Creating dense downtown-like areas is necessarily compromised, when road tunnels and tunnel entries are considered. This should be a serious concern, since tunnel mouths, in addition of holding up considerable swaths of land, diminish the close accessibility of the surrounding area. By necessity, there cannot be a side street or pedestrian crossing very near a tunnel mouth.

According to an interviewee, the surface of a deck requires quite a lot of resources in order to become an environment that is agreeable. There is always a chance that putting enough soil to have good surroundings with trees and plantings might be too expensive. This is the same concern that generally applies to house yards on top of a parking facility, which are often nowadays built in Finnish cities.

Considering buildings on top of a tunnel from an engineering point of view, a challenge comes from the long transversal span the underlying road imposes. A land island between the opposing lanes for example would alleviate this problem. According to one interviewee, the Urheilupuisto metro station in Espoo has on top of it a parking facility and residential housing development on top of that. This is achieved by a specific grid structure that had to be put in place when the metro station was built. According to the interviewees, the posts or supporting structures for a tunnel and for the houses have in the past had to be separate, but that now it is accepted that they can be integrated. The deck structure still has to be separate, though, in case of an explosion.

The participants referred to projects that are under way or already realized elsewhere in Finland. It was mentioned on two occasions that the motorway between Helsinki and Tampere that runs through Hämeenlinna is put a deck on (City of Hämeenlinna 2015). There a relatively light shopping mall was built on the shield. Another example, to which several interviewees referred to in the course of the interviews, is the Leppävaara Mestarintie road tunnel at Vallikallio. Several people referred to a case in which during Leppävaara planning process one house had to be removed from the final

development plan. This conceivably was because the supporting structures for the house had been omitted from one place perhaps by a mistake.

Safety concerns are especially dire when building on top of a tunnel. The Leppävaara Mestarintunneli was a testing ground for building on tunnels in Espoo. According to a planner, "it sounds like a good idea, but it is not technically that simple --- You have to get the foundations to reach solid ground." Without good foundation work, a tunnel does not support a house. However, tunnel building expenses being so great a lot of development is required to offset the incurred costs. Transportation manager, expert C from the Helsinki City Planning Office, explained there being an ongoing plan to roof the Itäväylä motorway near the Itäkeskus metro station:

> "And there too we specifically investigated building on a deck, and our technical-economic office calculated the amount of land use, that is built floor space, which you needed to have there so that deck building would be economically sensible. And they got quite high amounts of floor square meters then. What we initially thought having there was not enough, I don't remember the exact figures now. We just came to conclusion that there needs to be a lot of more, and that way make the economic quotation somehow work there."

There needs to be plenty of floor square meters built in order to get back the tunnel building costs. Obviously, though, it should always be considered whether a specific tunnel development is needed in the first place. By not building a tunnel a lot of expenses can be saved. If additional building of houses takes place, the income received from the development and building rights can be gotten with a considerably lower investment of resources.

To make the equation work between the desire to build on top of roadways and the challenges and costs involved, has led to an understanding that specific considerations for this kind of development are needed. The consulting firm Ramboll drafted directions for the Finnish Transport Agency on the matter of building on top of road or railway deck covers or shields (Finnish Transport Agency 2015). The guide is targeted at guiding the planning process, because "when the developers start negotiating about these with a city, they are not aware of all the things that need to be taken into account." The City of Tampere had prepared an account on building on top of tunnels in connection to their master plan work (City of Tampere 2014). One interviewed expert spoke well of what those responsible in Tampere had presented of their plans.

5.6 Principles of transport planning in Keilaniemi

The interviewed participants were asked about the transport-related questions in a varied way; they were asked to assess their understanding of the transportation goals and principles in the project, about how they think the interplay between different transport modes function and also how they think planning has turned out for walking and cycling. The question about transport planning were asked to get a clear view of what the participants thought was aspired and how the planning for different transport modes eventually turned out.

Pedestrian and cycling conditions were more or less uniformly assessed: the interviewees were of the opinion that the conditions improve due to better access to Tapiola Itäranta on the deck. This can be to a certain extent contested, as discussed in the section 5.3. The pedestrian and bicycle access is probably more agreeable and provides more moderate incline on the course. It was specifically spoken of that the pedestrian and bicycle paths or loops that go around the towers' base building on their northern and southern side are fairly successful. It was understood that a direct approach from the middle of the base building to Keilaniementie street is not possible due to a great vertical difference between the street and deck levels.

Public transport conditions will certainly improve in Keilaniemi. The western metro extension starts running in the fall 2016 (Länsimetro Oy 2015b). At the time of this writing the Jokeri light rail line was in a project planning stage, and proposed line geography and places of stops had been introduced (Raide-Jokeri 2015a). The Jokeri light rail line end stop was proposed at the north end of Keilaniementie street about 250 meters from the metro entry, which is at risk of being cumbersome regarding easy transfer to metro (see figure 23, page 54). This was not, however, at least the view of the interviewees who addressed the light rail end stop location. Many of the Espoo bus lines in southern Espoo will change into feeder lines for metro once the operating starts. By and large the land use choices in Keilaniemi will not likely that much affect the planning for public transit. Certainly one can present that the denser the development is and the more people in an area, the better servicing public transit is made possible.

The development on Ring Road I is very much an undertaking to enhance the capacity and fluency of motorized traffic in Keilaniemi and the surrounding region. According to the general plan of the project and a traffic forecast (City of Espoo and Uusimaa ELY Center 2012), the amount of traffic will increase 1,5-fold by 2035, and the planned development is aimed at meeting this objective. Another motive for rebuilding the Ring Road I is the desire to reduce the noise levels and the pollutants caused by traffic in the nearby region with the deck, which according to modelling are reduced.

All the interviewees mentioned that the solutions for the Ring Road I traffic corridor stem from the exigencies of the state. The actual solution demands that traffic flows on the road should be fluent projected to year 2035. Ring Road I is not on top of the priority list for the roads and tracks to be upgraded in the region, though. The transportation planners maintained that there is no utmost need to develop the road at issue. The concrete dimensioning and solutions for Ring Road I also are postulated by the state, which all the concerned stakeholders mentioned. It was said that had the road been city's road, the solutions that were arrived at would perhaps have been lighter:

> Expert N: "Well very – it was very accurately according to what the instructions of ELY [the Uusimaa Center for Economic Development, Transport and the Environment] are. I think probably those kinds of solutions that I could think that beforetimes or in other countries are made in a lighter way than here."
>
> Expert A: "How many lanes there should be, that's more [like a responsibility] of the ELY Center, and they also require conciliation --- for example the ELY Center has quite large these, their dimensions and so forth are quite large compared to if we want to build city, then we make that with a little smaller measurements."
>
> Expert D: "Well of course it – this is the auto city world, which has been swept under the carpet at some stretch. Now that we talk about boulevardization and the Espoo politicians have even decided that maybe we could boulevardize the Länsiväylä road, so this is a solution from another extremity. It is, it resembles more like the Smith-Polvinen way of thinking from the sixties. But of course this is a national road, and for that the fluency of the flow, it is… it is under the responsibility of the Finnish Transport Agency, and then it seems that this is the solution to that fluency challenge."
>
> Expert B: "We were thinking whether you can lighten this tunnel structure, well you can't. And it is, this is such a central traffic area that the state requires that this kind of tunnel has to be scaled to explosion loads. So, if something explodes there the tunnel cannot collapse. So it is this kind of, there are a lot preconditions that you cannot compromise on, so this is

what is causing the price tag. --- Probably we would have, if this was a street, [the solution] would be much lighter as a traffic corridor solution."

Expert H: "It is to my knowledge, could you say, in a traditional manner. The starting point is after all that it is a state road. And there is a particular prediction for 2035 traffic amount, which would primarily roll there, and it should be fluent and safe and so on. So in a way you could say the capacity and fluency and the scale, it comes mainly from the state now."

It is worth noting that the previous statements are not necessarily normative. In some participants' view it may be good that the Uusimaa ELY Center has larger dimensions and bigger regulations for road building, although some statements clearly imply a wish for planning for a smaller scale. In certain comments one can even hint traces of frustration for the dimensioning imposed by the state.

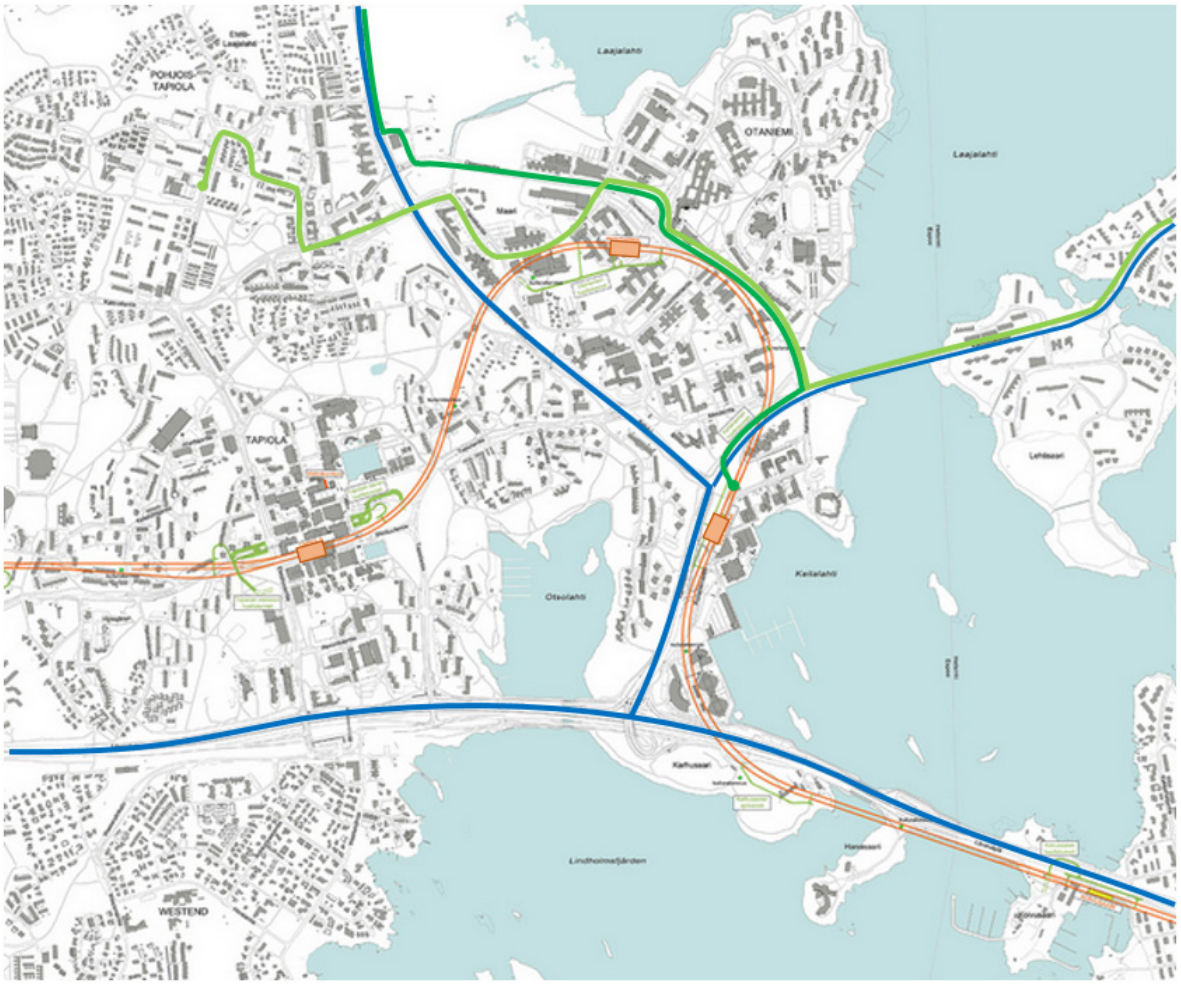


Figure 23: Main roads and the possible future public transport trunk routes in Keilaniemi and Otaniemi. Orange is the Länsimetro line, the blue lines are the Länsiväylä and Ring Road I roads, the thinner blue line to northeast is the Karhusaarentie/ Kuusisaarentie road. Dark green is the Raide-Jokeri light rail line and light green is an estimated route of a proposed Science tram light rail line. Sources: Raide-Jokeri (2015b), City of Helsinki (2013a), Länsimetro Oy (2015a).

The respondents had drastically differing views on the need for more fluency and capacity on Ring Road I. According to some, the road needed urgent upgrading, on the other hand it was also said that the road on Karhusaarentie is not particularly congested. According to expert M, the capacity should be increased due to the nature of tunnel engineering:

> "Well at this point there wouldn't be [need to improve the road capacity], the traffic goes with these current arrangements. If you compare it to many other places in this region, so it is on a satisfactory level. But, it follows in a way also from these tunnel arrangements, so if you start to improve, then it makes sense to improve (laughs) in such a way- and it comes from these requirements then, the ramps and mixing and diverging lanes, all these kinds of dimensioning, which comes from there. And the tunnel in itself already brings capacity, you cannot do that in a way, you have to take into account all these special things."

The state authorities have not been impressed by the undertaking of putting Ring Road I into tunnel, according to the interviews alone. The state authorities either stated in the interviews that there is no transportation-related need to develop the ring road or that the tunnel is problematic regarding the flows of traffic and traffic safety. The concern for safety may explain also the requirements for the scale of the road. A tunnel is a challenging structure and fault situations and guidance systems have to be concerned. It was also said that the state needs to be impartial for all the cities, and that nobody should do anything they want just because they pay. According to state authority representatives, M and L, the state needs to ascertain that the road construction requirements are met:

> M: "We have the kind of system, that if a city wants to develop these state roads, so we then make a planning contract. So they can plan, but on our conditions and then we are involved. And we see to that all these things are realized according to our requirements. And that is very strict dialogue then, and in a way mediation, how we achieve all the goals here."

> L: "Like I said, we were not that pleased of the tunnel in a traffic-related sense, there are these specific risks and hindrances and functionalities, so for this reason it wasn't our option. --- I think it is right, that we necessitate, there come the EU statutes from the tunnel directive, those things, and generally so that in a traffic-related way it is safe. We are responsible as those maintaining the road of that. So it is right that you cannot do anything you want. Even though, and there's that we- maybe the different roles, we look at that more from the point of view of the traffic of the whole region, and long-distance traffic, how it works. Espoo looks at it more from the connections of its own area, for example how they get as many customers to Tapiola as possible, so that it would be as alluring as possible. We have those… the traffic-related needs are a bit different."

The interviewed experts sometimes even criticized the state bodies for sticking to their policies quite single-mindedly and dictating the planning solutions in the project. The state bodies expect the road development to be carried out according to their requirements, as it was expressed in the preceding interview extracts. It can certainly be said that the state bodies' approach to the development seems quite a rigid one, where there is not left too much room for discussion and negotiation.

Considering the systems analysis approach is worthwhile with regard to the Keilaniemi case. An adaptive policy would be for all participants to engage in a joint discussion early on in the project, facilitating finding solutions for a perceived problem. This would help easing tension, when the key players have looked at the plan prospect from the project start.

In the Keilaniemi case the dialogue concerning the planning choices is also intertwined with paying for developing the road. This aspect is looked at more closely in the next section. What kinds of solutions for developing the road can be taken is contingent on who is officially responsible for developing the road and who is agreed to pay it.

At the time of making the interviews, a certain topical question was the planning solution at the intersection of the Tapiolantie street and the Ring Road I road. At the moment the intersection is an

at-grade intersection with street lights. A seemingly opinionated debate was held where the state authorities Finnish Transport Agency and the Uusimaa ELY Center did not first approve of keeping the intersection intact. After the local detailed plan for the tunnel had been accepted in 2012, the exact Tapiolantie – Ring Road I crossroads solution was left to be resolved during road planning. The road plan that was then drafted includes a certain parallel grade-separated intersection, which according to a Espoo City Planner, would have cost about five million euros to build, and is now discarded for its expenses. The Espoo City Board at its meeting on 16th March 2015 decided of not wanting to build this grade-separated intersection on the Tapiolantie road (City of Espoo 2015c).

The concern of the Uusimaa ELY Center and the Finnish Transport Agency regarding the Tapiolantie solution is that a queue at the Tapiolantie – Ring Road I street lights would extend until the Karhusaarentie tunnel, in which case the traffic flow to the tunnel would have to be halted before the tunnel. However, another interviewed expert, the road construction consultant Ramboll's project manager, stated that the risk of long queues at the Tapiolantie intersection is smaller than feared: "We have as planners I think been able to show with facts that there is no problem here. Different kinds of risk analyses have been made, which show that this solution's levels of risk are lower than for example those of the Mestarintunneli [the tunnel in Vallikallio in Leppävaara]."

The planning solution for the Tapiolantie intersection provided a conflict between the state official bodies and the local and road planning stakeholders. It also resulted in a brief halt in planning and negotiations for the project in the spring 2015. Rather soon, a solution to the question was found. The halt and the solution that followed can be seen as a moment of inertia leading to an incremental planning solution.

According to Finnish Transport Agency executive L, the result of the negotiations with Espoo was that during the construction work of Ring Road I on the Karhusaarentie road the Tapiolantie intersection remains as it is. Afterwards the solution is looked upon again. The ELY Center can decide if the intersection should be altered fast because of safety concerns. It was also decided the City of Espoo has a responsibility to start planning for a final bridge solution. In fact indeed, on 15th June the Espoo City Board gave its assent on the contract with the state authorities that the city starts road planning in 2020 for the Tapiolantie grade-separated intersection nevertheless, regardless of the related planning solutions at the neighbouring Hagalund area (City of Espoo 2015e). This decision connects the Hagalund area road and land use planning to the Keilaniemi transport and land use plan, something which will be looked upon in a subsequent chapter. The decision prompts starting planning for a Tapiolantie bridge and a decisive solution for the intersection after the first phase of the Keilaniemi development, and at the latest in 2020.

5.7 Responsibility for financing and building the road infrastructure

The state and the City of Espoo have signed a letter of intent concerning the responsibility of paying for the Ring Road I development and tunnel works already in 2012 (Uusimaa ELY Center, City of Espoo and Finnish Transport Agency 2015). In this contract, it was comprehended that the City of Espoo will be responsible for paying the construction works and planning, and also later the ongoing safety monitoring and maintaining of the Karhusaarentie tunnel. The payer question was not posed during the interviews. Instead, the theme surfaced from the respondents' answers.

The interviewees often referred to the share of responsibilities between Espoo and the state. They noted that there are a lot of state roads within the area of Espoo which make a central part of the city's transportation network. Planning for those together with the state – who owns the roads – is no strange thing in Espoo planning. It is an established process to apply for a permit to plan from the state, to draft a contract, to commit to pay for the incurred costs and to follow the instructions of the Finnish

Transport Agency regarding highway engineering. As noted in the previous section, there is no urgent need to increase the capacity of the Ring Road I in Keilaniemi, according to most of the interviewees. Moreover, state is not enthralled of the tunnel development in Keilaniemi, because it produces additional road safety concerns. It is thus understandable that the state were not willing to pay for the costs, which are not necessitated by the state bodies, once an initiative to develop land use and the road network was launched.

According to the Finnish Transport Agency, there has been a slight shift in distributing the payment responsibility for transportation corridor projects. In December 2014 a parliamentary committee published a report which dealt with the repair debt of the city and state roads and tracks (Ministry of Transport and Communications 2014). New financing methods were inspected for the report, according to the interviewee, and one of the definitions of policy is the principle that those who gain will pay. This would concern both industry and private companies and the municipalities.

During the political approval of the project in 2012 (City of Espoo 2012f), it seems, part of the elected persons did not approve for the project due to Espoo having the sole responsibility to pay. Tunnel and towers detailed plan came to be decided in 2012, when the economic downturn had already lasted for several years, which was likely a factor in the discussions. In part as consequence of this criticism focusing on money, the plan approval by the City Council necessitated that the development should be done only with the money that is recoverable from selling the plots. The Council also required that a specific decision to start the works in Keilaniemi should still be made by Council, after the planning had been completed and the construction works could start. This required last approval by the Council possibly later led to a strict inspection on the development costs, and to some innovative incremental changes for the plan layout. The decision of putting no other money than that received from selling the plots meant that the city and the road planners needed to look for planning alternatives which would ensure the project stays under the budget limit.

The fact that Espoo pays for the all the development expenses was generally taken as a given in the interviews. It was, however, sometimes criticized from various viewpoints. The criticism implied that in the capacity of being the one who pays, Espoo should have more say in how the planning resolutions turn out, instead of the state determining the planning solutions:

> Expert E: "--- and of course it bothers me a bit in this official preparation that, even though the state didn't agree to finance this increase in extra capacity, it was said that this is just something that has to be done. --- It can be, the state of course can at the same time say that there needs to be more capacity and that we don't pay, because they can always say that. But in that case it is more like a problem of Espoo, if they don't have the gall to think what is really reasonable."

> Expert F: "But then, there are also the norms and goals, even though like you said there comes feedback from ELY and elsewhere that the capacity is enough for the time being, there are the transportation planners in the Finnish Transport Agency who- they have put brakes on cutting these. The transportation planners there say that according to their norms the road should be that and that much. So we have been horrified of that message and their content, what is said in those official comments and so on, that they are requiring even more massive things. ---- It is more desirable that the actual guidance of the ELY Center and above all the Finnish Transport Agency were more modest. Because when the city has to execute, so it is quite hard to think that they set all the rules. But it has been improved. Now that we are on the final stretch, it seems like we find a common ground."

> Expert K: "What has been a problem here, it stems already, in the end from the shortage of investment money of the state. So, in Tampere the state pays thirty percent of the tunnel,

here it doesn't pay anything. And still, this isn't, like I said, this is not in a way a pure real estate development project of the City of Espoo, to acquire seventy-two thousand floor square meters of sellable residential building right. It's not, so in a way you improve the qualities of the Ring Road I on Karhusaarentie, a public road. And the state is not ready to pay for that, so for certain it has been one thing to slow down or hinder [the project]…"

Expert G: "It is a question of, the starting point being a difficult one. When the state doesn't have the money or the need to develop that road arrangement, it doesn't have that kind of traffic-related problems that it would be among the top priority in the projects in the capital region. The driver for developing this area is land use development. And then the state sort of gets off the hook, they say let the city do that and they'll accept the things. In some way you would wish that the road administrator would contribute more in pushing the solutions, and not just putting a spanner in the works."

There is clearly a conflict in who pays and who can decide on the precise planning dimensioning. Assessing the responsibility to pay, it can be perceived that as the state necessitates specific larger-scale planning solutions it should contribute according to the capacity increase in the road function. After all, what is needed in capacity in 2035 is also a responsibility of the state road management.

Instead of merely a question of who is the one responsible to pay for the development, one could, however, imagine some more drastic, even socio-historical adaptations that answer to the question of who pays and who is responsible for deciding on the planning of roads in larger city areas. Even though the state bodies express concern, also in the interviews, that the City of Espoo does not look at the interest of the whole Helsinki Metropolitan Area when it develops the roads and land use, this concern can be seen implausible. Espoo naturally also has an interest in improving the liveability and functionality of the region by the road planning solutions it makes, as the accessibility and fluency of its transportation system also benefits the city itself. It was, after all, actually said during the interviews that the City of Espoo is looking for developing the area in Espoo which contributes to the whole economy, and that for this reason developing the Ring Road is worthwhile.

According to the Finnish Land Use and Building Act the municipalities are responsible for land use planning and land policy within their areas (Land Use and Building Act 132/1999). Generally the cities are especially equipped to consider the changes of land use in their area and can also plan accordingly. What is more, and should perhaps be bore in mind, is that building for accessibility is what land use planning fundamentally is, as will be seen in the sections 5.10 and 5.11. A conceivable socio-historical change is to hand over the right to develop the streets and roads within their boundaries to the Finnish cities, and for example give them a lump sum contribution from the state with which to do so. Another way of realizing this is to turn the state roads inside a certain boundary to nominally city-owned streets, which would mean the responsibility developing and managing them would naturally be the domain of cities.

Giezen, Bertolini and Salet (2015, 1010) discuss in their study a case where a large mega-project called RandstadRail was being planned. During the project protracted discussions and deadlock occurred, resulting exactly of the question of how much the state and the Ministry of Transport in the Netherlands were to pay for the project. Cost overruns had occurred in projects in the Netherlands at the local and regional levels. Compared to the situation in Keilaniemi, the Dutch ministry had very little influence on how the project was managed. The solution arrived at, lump sum payment for the project, is characterized by Giezen, Bertolini and Salet as a radical change to the previous approach of financing those types of projects. According to Giezen, Bertolini and Salet, this "proved an effective way of placing the financial risks at the same governmental level as the operational risks", making thus both more manageable. Lump sum payment, of course, was more consistent in the

Netherlands when the federal state had no bearing on the planning of the project. The Finnish situation aggravates the need of finding a balance with state and cities' responsibilities in the Finnish context. Other lessons too may be drawn from the comparison with the Dutch case and the Keilaniemi project. Having Espoo pay the lot certainly places an incentive onto the same player to manage the costs that are produced by the development project. It stimulates the project organization to ensure operating within the budget.

Transferring the responsibility of planning the current state roads from the state to cities would be a policy change that equals socio-historical adaptations that also Giezen, Bertolini and Salet (2015, 1011 – 1012) describe. In the RandstadRail example from the Netherlands, creation of city regions impacted greatly on the project. The responsibility moved to organizations whose prime business was stimulating regional connectivity, and who were better equipped to negotiate and make decisions. Of course the institutional settings of particular environment and particular country have to be taken into account. In Finland, planning is largely in the hands of independent municipalities, and it might be a logical step placing planning in the hands of those entities, cities and municipalities, that also are traditionally best equipped to make decisions on regional and local levels. The Helsinki master plan draft that involves a scheme to boulevardize the incoming freeways looks like having the potential to initiate that kind of socio-historical change. It would be a break from the past and not likely to be undone in the near future (cf. Giezen, Bertolini and Salet 2015, 1012).

Land use and transport planning are interconnected in a profound manner especially in the city areas. Depending on the scales of specific road or street areas and their capacity, decisions on where to build houses and offices may or may not be made. Transportation planning should not concern only the capacity and fluency of specific roads, since planning for using land affects the need to travel. As will be seen in the section 5.11 about the boulevardization in Helsinki, whether or not introduce new housing development on the current road areas will have large-scale impacts on the accessibility of the city region of Helsinki. This also underscores the fact that transportation planning is a feature that the cities should have a say about when considering their current and future land use. Another option is that the state and various inter-municipal bodies should apply themselves more strongly to the land-use-related questions within the city regions.

The interviewed state officials noted that there might be a transitional period going on regarding city planning and state roads. It is obvious there is consideration to what extent the state controls transportation network development within large city regions, once the City of Helsinki in its master plan proposal aims boulevardizing the incoming freeways. Like already said, however, the state bodies were currently of the view that the cities at the capital region would be not so much interested in the functioning of the whole region's transportation system:

> Expert M: "It is indeed a good question, and we have thought about that ourselves quite a lot that what the extent is, until where do the state roads stretch. It comes especially in these thoughts of boulevardization of the City of Helsinki also, that if there will be those, so it's clear that they are streets and we are not dealing with them anymore. But there should be that kind of coherent policy and entity. This is more or less a transitional period that is going on at the moment, this thing has to be thought of. But it is not such an unambiguous issue, because the municipalities always pursue their own interests. And they sort of garnish [the benefits] of the current road network, they see in a way only their own benefits and actions there. However the state has a responsibility to look at the transportation system as a whole, so that the needs of industry and commerce are met, connections to the ports and so forth."

> Expert L: "If we think about this Helsinki region – or an even regionally big issue, if we think about the transportation network now, we have [the state is responsible for] most of the railways, except in some places the factories and the port railroad tracks, so they go quite far. And in roads we have this state network of highways or other state roads outside the city centers. And in the cities the streets and where they end, so let's say there is a lot to develop. Espoo has traditionally had awfully lot more state roads than many other municipalities. --- In then, when this is part of Ring Road I, so it is justified that we are involved there. If we start to develop the Ring Road a very street-like, so in that case those, then the state roads could end at the Ring Road III. The transportation system has to work, and probably you will see, hopefully you will be somehow involved, when we study building these boulevards now, and exactly the transportation system, who is in charge of what. What is the service level, what has been- the service level of transportation, which means punctuality and undisturbedness of what is offered."

5.8 Reducing the road construction costs and phasing the development

The costs of developing the Ring Road I on Karhusaarentie in Keilaniemi were reduced by raising the alignment of the road by about five meters. The initial alignment of the road was substantially lower in part because there needed to be a pedestrian overpass on the Karhusaarentie stretch between Otaniemi and Keilaniemi. By one account the planners at the City of Espoo, and by another the City Planning Board, did hold on to this overpass called Valokeila, which would have been an axis to Keilaranta seashore. According to one interview reference, the Valokeila overpass was meant as an architectural element in the street environment. When making the studies that took place to lower the development costs, it was noticed that a grade-separated connection for pedestrians and bicyclists from Otaniemi to Keilaniemi was technically possible to carry out as an underpass.

Discarding the Valokeila bridge was the biggest tool in lowering the overall development costs. It is also an incremental adaptation that was discovered and decided upon during the planning process (Giezen, Bertolini and Salet 2015). The adaptation made significantly lowered the developing costs, though it cannot be seen as a more drastic radical adaptation; the main goals, route or by and large the preferred design of the road and the tunnel did not change. Contributing to raising the alignment of Ring Road I is also moving the maintenance space and ventilation shafts planned between the deck surface and the car tunnel to the sides of the tunnel. The new higher vertical alignment of the tunnel would mean less rock exaction which is a significant general factor in cost. According to an Espoo city planner, rock and soil excavation, abutments and troughs were obviated because the road does not have to go so deep.

The incremental adaptations that occurred during the trimming of projected construction costs involve the following measures. These demonstrate a certain technical adaptation capacity within the project organization (cf. Giezen, Bertolini and Salet 2015, 1008):

- Discarding the Valokeila pedestrian and bicycle overpass
- Locating the ventilation and other technical spaces on the sides of the tunnels

The original cost level generally mentioned in the interviews as well as in the planning documents was 120 million euros for the development taking place in Keilaniemi in this Espoo detailed plan area numbered 220823. The solution regarding the intersection at the crossroads of Tapiolantie and Ring Road I was not specified at the time of approval of the detailed plan, and was thus not included in the original figure.

Figure 24: Illustration of the Keilaniemi road and towers development first phase (City of Espoo 2015i).

It was seen that, were those costs added to the overall development costs, the selling of the plots for the towers would not have been able to cover the road building expenses. For this apparent reason the Espoo City Board decided to not build the Tapiolantie street grade-separated interchange in the first development phase. With the former deeper alignment of the ring road in the tunnel, the development costs risked being too high in relation to land price prospects. According to the interviews, the new total cost of the tunnel development is estimated at 93 million euros.

Developing the Keilaniemi roads and towers will be decided phase by phase. The Espoo City Board decided this on the 15th June 2015 as a measure to reduce the development risks for the city (City of Espoo 2015e; Uusimaa ELY Center, City of Espoo and Finnish Transport Agency 2015). The phasing of development is another incremental adaptation that occurred during project planning. The measure means that the Espoo City Council and Board, likewise SRV and other involved parties, will decide on each part separately. The first phase consists of building two of the towers on their plots and of building the tunnel and the deck partially (see figure 24, page 61). The

transportation-related solution as well will be more stripped-down than the intended eventual result. The cost estimate for the first part is assigned as 45 to 50 million euros, which is naturally the money Espoo hopes to get from selling the first building plots (City of Espoo 2015e).

Although the phasing of the construction of tunnel and the towers change the development process heavily, it can still be seen as incremental, not a radical, adaption, because it allows the initial purposes and aims of the project to be fulfilled. In the end, if all goes according to plan, and no fundamental changes to the project goals are made during the construction, there will be a road tunnel and four towers in place in Keilaniemi, according more or less the original intentions of the City of Espoo and SRV. Nevertheless, incremental changes can also have a great impact and value, as is seen with the cost reduction of the project. It is worth noting, that since for example no systems analysis type of discussion of the alternatives regarding the goals and solutions was held in the beginning, the project has had only one potential vision to go ahead with. This necessitates continuing sticking with the goal during the construction stage, which is likely to involve many small incremental changes to the project design as well. (Priemus 2008; Giezen, Bertolini and Salet 2015)

In itself, the justification for making the development in phases is to reduce the risks of both Espoo and the construction company SRV. Espoo does not want to invest more than necessary, upfront and at once, but wants to get the tunnel and towers plan going:

> Expert F: "Certainly for everyone, but of course especially from the city's vantage point, so that we think that we have it built phase by phase. Nobody wasn't, not SRV or anybody else ready to make it so that they buy or pay all the hundreds of millions at once." Interviewer: "Yes, so the phasing relates to minimizing the risk of SRV." F: "Yes it is in a way understood that in order to- our premise is of course that the risks of the city should be minimized, but the city also has to ensure that it builds as briskly as possible, all in all. But in stages, so then we should achieve it. The condition of SRV is of course logically that then we make a contract roughly speaking always one tower at a time. --- It looks like now that it moves forward, because there- because for those [two towers] we can make the dropping of the alignment of the road – and when you have to do the compensatory transportation scheme for the whole building period, so there is a huge this kind of functional and also financial arrangement there."

Phasing a process is required in order to facilitate development and to also make it more acceptable to the elected persons. Several interviewees explained that the time span of investing money and receiving benefits from it cannot be too long in a big development process like the one in Keilaniemi. This calls for measures where the positive side payments will be got at the same time as the negative financing costs incur. It was said that neither municipalities nor the state any more have that kind of money for which the repayment period can be long.

The down-side of doing the construction works in phases is at least that the harm caused by the construction works is split on a longer time period. This involves the nuisances caused to the neighbouring areas and also to traffic. In the words of one interviewee, "phasing always brings the harms twice". In Keilaniemi, in practice making a partial tunnel with fewer lanes means more mixing of traffic flows into same lanes and more time taken to get into correct lanes before the tunnel. However, according to traffic simulations, this should not cause a problem, and will be addressed in a later project phase.

The analysis made for this thesis treat the Keilaniemi project only for its planning part. The planners will probably face a lot of challenges during the actual construction of the tunnel and towers. Many mitigation strategies to make the adaptations would risk delaying the construction and adding to the

price tag of the project. (Giezen, Bertolini and Salet 2015) When taking the mitigation costs into consideration, more radical adaptations may sometimes be cheaper.

In first phase of construction the ring road first moves on to the place of the plots of the towers, when the excavation and tunnel building begins. Then the traffic moves back either on top of or in the tunnel and the construction of the towers may initiate. A schedule for the first phase is that after beginning the works in 2016, the two towers start to be built in 2018 (City of Espoo 2015g). By necessity the later stages of the Keilaniemi project will take place earliest in the 2020's, making the development plan a relatively long-lasting ongoing process.

Developing Ring Road I in the Keilaniemi area will as well be tied to developing the Hagalund area, as mentioned in section 5.6. As interviewed expert H noted, the next stage for the ring road development, tunneling and residential development possibly takes place in Hagalund:

> "But that, it is not necessarily the next phase of Keilaniemi, it may be that we have developed some new thing at Hagalundinkallio, so the next phase would take place in Hagalundinkallio. Because here it is explained too, in this statement all those kinds of things are explained, it is connected to a larger whole, this and that is under way. So in this sense, of course here we begin the first phase of Keilaniemi, but at the same time the further planning of Hagalundinkallio begins here, because now there will be such temporary arrangements on Tapiolantie that we have to get that development continued. In a way doing this first phase is not just the first phase of Keilaniemi, but this is a force that sets in motion the complete whole. Without this you cannot develop anything at Hagalundinkallio."

While it certainly would be possible to develop things at Hagalund even without the development in Keilaniemi, Keilaniemi does seem to be tied to the Hagalundinkallio development at least by necessitating the Tapiolantie – Ring Road I intersection development.

5.9 Hagalund area tunnel and residential development

As is seen earlier, in sections 4.2. and 5.1., the Hagalund area was originally the first in line for new development around the southern end of Ring Road I. Here it is explored why the change in this precedence took place and what kind of general land use and transportation planning options in Hagalund there may be.

Like noted in previous sections, the Hagalund area development is at least in some way contractually tied to the development of Keilaniemi. It is the duty of the City of Espoo in any event to start planning in 2020 for a solution in which the Tapiolantie - Ring Road I intersection be turned into a grade-separated solution (City of Espoo 2015e). This promotes in its part planning the Hagalund area road and land use. It was noted in several interviews that planning for Hagalund will promptly start when the Keilaniemi tunnel and towers plan development has been settled on.

A certain motivation for developing the hill on Hagalundinkallio is the former T3-vision in which the areas of Otaniemi, Tapiola and Keilaniemi are brought together to a more coherent whole and the barrier-effect of Ring Road I is reduced. Like it was said in the interviews too, bringing the neighbourhoods together is not intrinsically sufficient for starting planning; also new building rights from roofing the ring road is needed. During the interviews the Hagalund planning solution was still very much open and subject to change. For this reason there is also much more uncertainty here in analysing the planning possibilities and solutions for Hagalund.

The Hagalund area is more difficult in terms of infill development than Keilaniemi is. The interviewees referred to how there would be still more opposition in building next to Tapiola there, and noted how the values of cultural history for the Tapiola garden city would be at play in a more pronounced way. There will be less space in Hagalund, and real estate development probably would take place on both sides of the current road. As it was said in the interviews, the leeway is much smaller than in Keilaniemi, which already is an area for taller buildings. Hagalund is a step away from both the Keilaniemi and Otaniemi metro stations, though available from both of them and located on a higher vertical elevation for sea views. Representative of the attitudes, one interviewee even noted an impression that there seems to be a resistance in Tapiola toward bridging the gap at Hagalundinkallio, since as it is Ring Road I is a natural barrier blocking prospective development. On the other hand, the interviewee noted, "which of course, had it not been built, no-one would accept that that kind of chasm would be built today."

In planning on and at Ring Road I at Hagalund, according to one architect, several hybrid solutions have been developed over time. At the time of the interviews, the most probable development seemed one where there would be a non-continuous cover of at least two small separate decks over the Ring Road I. A gap between smaller decks would permit entries from the Tapiolantie street to Ring Road I. Naturally a two-deck solution would permit less residential or other development in Hagalund, contributing to less profit in land sale or building rights. As seen in section 5.5., it may not be feasible to build directly on top of a concrete deck either in Hagalund due to safety reasons and a much more expensive deck that it entails. Two interviewees noted that there could be some lighter building made of wood on top of the Hagalund concrete deck. Otherwise the most likely development directly on top of deck would only be car parking facilities and a public park.

Since the expert interviews there has been development in planning for the Hagalund area. In October 2015 (City of Espoo 2015f) Espoo City Board Division for Business and Competitiveness launched decision-making process for the Hagalund area development between Otaniemi and Tapiola. In the solution drafted for the city board division the Ring Road I in Hagalund is tunnelized. However, according to an illustration, the connection from Tapiolantie to Ring Road I goes along a "city boulevard" and via the Maarinsolmu grade-separated interchange (see figure 25, page 65). The meeting minutes state that all the previous solutions have led to a problem with the Tapiolantie – Ring Road I intersection and ramps, which have reduced the possibilities for land use. The new plan aims to take advantage of the rock base as far as possible, with an excavated rock tunnel section.

As described in the meeting minutes (City of Espoo 2015f), the novel approach is a rather innovative solution to the Hagalund development problem. It clarifies the street network in the area between Otaniemi and Tapiola, and has actually the potential to increase the immediate accessibility within these neighbourhoods. The plan aims to introduce a large amount, provisionally from 150 000 to 200 000 floor square meters of new development within the area, where the main part would be for residential use. According to the Business and Competitiveness division meeting minutes, the premise of the project is the same as in Keilaniemi; the project is carried out by land sales revenues and land use fees incurred by the plan.

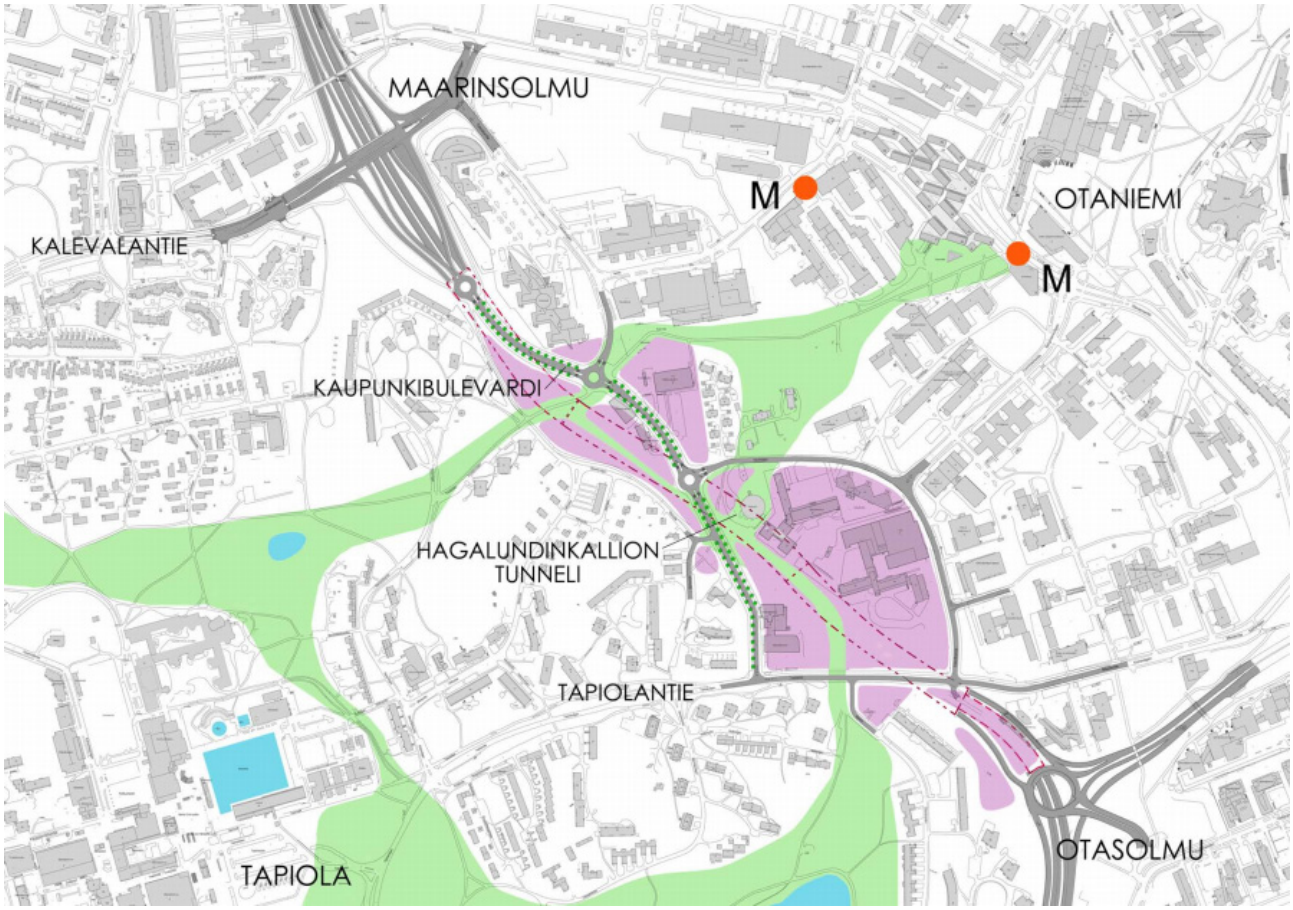


Figure 25: The Hagalund area solution presented for the Espoo City Board Division for Business and Competitiveness in October 2015 (City of Espoo 2015f).

In section 4.2. it was noted already, based on the reading of planning documents, that the reason to opt for the concrete shield in the current place of Ring Road I has been that it would permit entry by car from Tapiolantie to Ring Road I (City of Espoo 2011b). Based on the interviews, this has been the main motive for the concrete deck cover in the current road place:

> Expert H: ”Well there was that- when it was at first, it was a [excavated] rock tunnel, which passed Tapiola completely in that rock tunnel. And it is, it is a bad solution in such a way that if we wholly cut the connection to Tapiola here, so- I think that the center of Tapiola, which is there, so if you can come there only by these long links, so this is this kind of natural route to Tapiola as well, this is this kind of traditional, you will go to the central parking facility [in Tapiola] from that roundabout, so.. So, this connection to Tapiola is important, otherwise these corners are then turned into a museum for good.”
>
> Expert G: “So we started [thinking about] that when the project planning started, it was one of the first things to study, how can you get an intersection from there to Tapiolantie. The elected bodies of Espoo necessitated it to be studied, that we absolutely need a connection here.”
>
> Expert B: “One might be also that, it has been strongly suggested that you need to get from here on ring road to Tapiola exactly. So that would have been difficult in the rock tunnel alternative.”

The interviewees recalled certain other potential factors for the rock tunnel to not be feasible. According to one interviewee, the longitudinal profile of the rock tunnel may be problematic, and

near the Maarinsolmu junction north of Hagalund waterproofed troughs might be needed. There is conceivably soft and wet ground at the northern end of Hagalundinkallio near the junction of Kalevalantie and Ring Road I. One interviewee thought the rock quality might not be ideal for building a tunnel.

With the recent approach illustrated on page 65, another potential solution to the problem of the connection from the Tapiolantie street to Ring Road I has been introduced. There seems to be a point of making this kind of larger, although still incremental, adaptation, and gaining more with new development. When thinking about the Hagalund development from a longer perspective, it would perhaps have paid off to create and test alternatives already in the beginning of developing Hagalund as well. This could have been made in the fashion of systems analysis (Priemus 2008), where different alternatives are measured and weighed against each other according to preconceived criteria.

When going to interviews, there was an understanding of inquiring about planning measures conducive to saving development costs. At that point no other means to provide the Tapiolantie – Ring Road I connection was in sight. The transportation planning experts interviewed were asked whether in their opinion the connection from Tapiolantie to Ring Road I is something that should be maintained from a transport-related point of view. It was expressed generally that accessibility-wise the link is not indispensable:

> Interviewer: "So what is your opinion, do you need to get from Tapiolantie to Ring Road I?" Expert A: "Well at some point I was of the opinion that you do not, and you have different viewpoints there. --- I would almost say that I wouldn't want to touch this at all. I wouldn't want- and I wouldn't want to touch this road, and now if you start to arrange some strong connections here, and there is now a big pot growing here [in Tapiola], so soon someone might come up with a plan of turning Tapiolantie into a four-lane street too."

> Interviewer: "Is it necessary then to get a connection from Tapiolantie to Ring Road I? Expert G: "Well Espoo has it as a matter of principle, and you have there.. If we think about developing the center of Tapiola, and how much the businesses and individual players invest there. So.. if you cut down existing connections, and reduce accessibility, so that is not acceptable. And there are rather strong comments from the stakeholders in this area, together with the City of Espoo, so… I have interpreted it to be a prerequisite."

> Expert C: "But of course the big thing here is that, there is now that Tapiolantie junction to Ring Road I, and that would be taken away. It would, surely it would change driving routes quite a lot. Probably it- well you can get from this area there that way, but you go from that area for example more from here." --- Interviewer: "So how significant would it be if that connection from Tapiolantie to Ring Road I there was removed?" --- C: "Nothing dramatic. It would- these local connections would work here as they are. It is more as a land use thing that I see that."

In practical terms, an informed decision should be made about the Tapiolantie connection for its possibly high incurred costs. The importance of the Tapiolantie intersection in terms of transport options needs to be assessed, as well as in financial terms the rock tunnel and concrete deck tunnel alternatives. Building a grade-separated intersection for the sake of fluency for car traffic would be costly, and would have to outweigh the inconvenience for other development.

Here the option of putting the Ring Road I into an excavated rock tunnel, that uses a slightly different alignment through Hagalundinkallio, is briefly discussed in financial terms. A rock tunnel option would have certain distinct advantages compared to the deck tunnel. The construction work may take place while traffic runs in its current place, making the arrangements for the construction period

easier. A connection from Tapiola to Otaniemi would become rather straightforward, when there would not be need for additional bridges or interchanges. The rock tunnel would conceivably be somewhat more costly to build. The compensatory fact here is that it would make a larger building volume possible in the Hagalund area on the rock base near the current road location.

Figure 26 presents some estimates for the comparative costs for the Hagalund rock tunnel and concrete deck cover options. The comparison does not take into account the most recent proposal for the Hagalundinkallio Ring Road I development.

Figure 26: Hagalund development comparison for costs and benefits between the concrete deck cover and the rock tunnel alternatives.

	Concrete deck	Rock tunnel
Projected development, floor-sqm	60 000[1] / 50 000[2]	80 500[1] / 100 000[2]
Value of building right, €/ floor-sqm[3]	630	630
Benefits	37,8 million € / 31,5 million €	50,7 million € / 63 million €

[1] Expert D in an email received on 28th August 2014.
[2] Expert D in the interview on 9th April 2015.
[3] Peltola 2014.

While it may not be that Tapiolantie would be very easily turned into a four-lane street, a connection from Tapiolantie to Ring Road I naturally would conduct more traffic on that street. The planning details of Hagalund are more out in the open, whereas in Keilaniemi they are tried and tested and seemingly well established. There may be less space in Hagalund for the substitutive road arrangements to do the groundwork and build deck. Thus developing the road at its current place may be also more difficult. While it is essential that the city receives payments for providing building plots for construction, this might take somewhat more time in Hagalund than in Keilaniemi.

5.10 Boulevardization as an option for the development of Keilaniemi

Boulevardization of roads and road sides is a topical issue in planning the capital area in Finland. In its master plan draft Helsinki plans to boulevardize its incoming freeways and get very large amounts of space for residential development. The boulevardization prospects to some extent came into public discussion after architect Carlos Lamuela in his master's thesis (2010) made a proposition of turning the motorway Länsiväylä, running through Lauttasaari in Western Helsinki, into a city boulevard. Since, other cities as well have pondered upon the question of boulevardization (e.g. City of Oulu 2015). In Espoo, according to the interviews, there has been specific talk of boulevardizing the old Turuntie road that lies parallel to the Turku motorway. The newspaper Helsingin Sanomat likewise has reported on the Espoo and Helsinki plans on jointly studying the boulevardization on Länsiväylä (Laita 2015). An indicator that boulevardization is a relevant reference also for the Keilaniemi development, 8 out of 13 interviewees explicitly mentioned boulevardization before it was brought up in a question.

During the Keilaniemi detailed planning process, and during the May 2012 plan approval Council meeting, it was suggested that instead of solving the land use and transportation puzzle with a tunnel scheme, a boulevard in the place of the Ring Road I in Keilaniemi should be studied (City of Espoo 2012f). The motion suggesting this was not passed by the numbers 49 against 16. The financial adversities that the development in Keilaniemi has been facing resulted in two council questions after

the approval in 2012, and the answer that was prepared for one them was returned to preparation by the Espoo City Council: the council required that the costs and amount of building rights of the boulevardization alternative should be estimated (City of Espoo 2014b).

Finally, when assessing the start of construction works for the road tunnel in Keilaniemi, the Espoo City Council were not presented the costs and benefits estimations of the city boulevard alternative (City of Espoo 2015h; 2015i). This shortcoming in providing alternative calculations can be seen as sign of path dependence in the project. It may not have made sense for the City of Espoo to answer to this call, since so much had already been done for the tunnel option. Omitting the answer to the council decision of June 2014 (City of Espoo 2014b) also possibly shows the embeddedness of planning for road transport capacity in Espoo, as a city boulevard-like solution does not seem feasible to the city planning organization.

According to one account one reason to start with the tunnel and towers development is exactly that there is talk about boulevardization as an alternative. While it may be in the long haul, the scheme still might have potential to hamper with the new proposed development:

> Expert H: "And another, which may, which undoubtedly has an effect on the background, surely it can be brought up here, is that now that Helsinki is thinking about these boulevardizations. And then, the idea is a bit like why to make these large roofings and all, if this boulevardization is little by little coming here in Southern Espoo too. But, even though I like the boulevards myself, that is clear, the boulevard project of Helsinki is in a quite long run. And anyway this is a state road for the time being and it is not in view, the state does not do boulevards. If you want to enhance this environment for this generation, it needs to be done like this."

The argument of boulevardization is justified because there are actually only two ways to introduce new development on the immediate vicinity of the Ring Road I, or other main road for that matter: covering the road with a deck or downsizing it to a smaller road or a city street. Otherwise the harmful effects of traffic cannot be mitigated, and new residential development close to a road would not be made possible. It certainly is true that more experience and more considerations for the possible boulevardization should be gathered. Likewise, to comprehensively assess the benefits and costs and the feasibility of the scheme would be hard at least on a short time-scale. It is understandable that Espoo does not want to invest scarce resources on the assessment, now that so much resources and time have been invested in the current road tunnel planning. This again shows the path dependence that planning has gotten into; for maintaining increasing returns, the development would have to be made as it is envisaged at the time.

Covering Ring Road I with a deck is now the chosen way, which, however, underlines the need to talk about the boulevardization alternative and estimate its impacts on a general level. Relating to systems analysis, creating and evaluating alternatives add to the adaptive capacity of a project. Although the means differ drastically, the general aims of the two solutions are in any case the same: they help to provide infill development in city structure.

Addressing the boulevardization proposal here is justified also for several other reasons: it may be a financially sound alternative to the tunnel and towers plan, permitting more development in a larger available swath of land and costing a lot of less compared to tunnel. Even though it would impede the traffic flows, benefits in land use would make the overall accessibility by all the transport modes better, as will be seen in the next section. One reason for briefly addressing the boulevardization option are its long-term impacts on city structure. Boulevardization can be seen as a new term for extending downtown-like areas in city structure. Though it was not studied for the current Keilaniemi

development, it provides a principle in city-building that is likely to have an effect in the future in the planning of Espoo as well.

A boulevardization option is a radical adaption, in the terminology of Giezen, Bertolini and Salet (2015, 1003), in that it would entail changing the objectives, policies and practices of the project in using an in-city motorway like Ring Road I and the area surrounding it in a fundamentally different way. Like Giezen, Bertolini and Salet (2015, 1009) characterize such adaptations in megaproject case studies from Holland, radical adaptations can be cheaper when taking into consideration the mitigation costs that incremental adaptations would necessitate.

In the following the impressions that the interviewed experts had on boulevardization are displayed rather extensively. A novel proposal, quoting land use and transportation planning actors add to the general knowledge about the subject. During the interviews, the participants were given a picture from the Lamuela Orta thesis (2010, 67; here figure 17, page 34) as a sketch for Ring Road I section alternative in Keilaniemi. The interviewees were generally unaware and uncertain of, and mostly sceptical with, the city boulevard alternative. The expressed lack of information and experiences comes through in the following extracts:

> Expert B: "Well that's, I think it has been in the talks here on Ring Road I in Keilaniemi, and I'm always amused by these boulevardizations, that what it does mean. And I have understood, if we talk about boulevardizing Länsiväylä, it means taking down the grade-separated junctions and building houses on the side. This [Karhusaarentie between Otaniemi and Keilaniemi] is in a way already a boulevard, so what does the boulevard mean, or does it just mean that we plant some trees on the side of it?"

> Expert A: "I'm not perhaps yet convinced what you actually achieve by it. If we look for taking these, should you say, land areas that are empty into residential or other use, then I don't know what boulevardization can do with just for example noise and emissions, if we haven't been able to build in a noise area without noise abatement. --- And I haven't exactly internalized the basic objectives of this boulevardization."

The interviewed participants often also outright discarded the boulevardization alternative. In several views the boulevardization option was estimated as something that would be good to have, but not realistic or "from this world":

> Expert H: "Well it looks really nice, but it's not an alternative. What I mean by that, I'm not invalidating it in any way of course. This kind of city is nicer than a motorway city. --- Eliel Saarinen would have drawn that kind of picture too, and there would have been trams and other nice. But it is not from this world." Interviewer: "What problems does it have then?" H: "You face there the question of where the cars how long do you come with cars. Because the throughput of these streets, it is not at all the same what you have there now driving 80 kilometres per hour. --- This is the way that city development should go to, so that they are are… but it's hard to imagine, something really surprising should happen, so that the course would change. --- As such it, making this deck and the whole system, you have these towers here. And if the world changes, so certainly there would be someone to pay for the demolition. Because there is a lot of building right in every place, and in good places. It is not, it is not in here, then the world changes, but that kind of situation is not in sight."

> Expert B: "So there are more of something, these towers I guess..? Well it looks like it is a route whose capacity is significantly lower than that of the current one, if that means there would be an at-grade intersection on Länsiväylä. --- Many questions arise, but it's exactly that… Many things would need to change so that this would be possible. I'm not saying

that, probably it is, it is not worse than this, but it is in a way thought for a little bit different kind of world."

Expert G: "There's of course… it is so totally different than this… this transportation network, which has been developed in the long run. Well okay, now we have the metro, light rail and one… vehicular traffic we perhaps can limit with road tolling arrangements and get the level of traffic essentially lower so that in a technical sense these street-like solutions would become possible. But I think that, in that case [laughs a bit] at least in the capital area inside of Ring Road I the transportation network should be quite a lot different. So the repercussions of these boulevards to the other road and street network are really quite strong."

Expert D: "I think it is not from this world. And of course it is good – that is, it can be from a better world. But as long as there are the ring roads in the first place, and there is for example Länsiväylä, hundred thousand cars on a ring road, and maybe ten thousand can fit in here, so where do the other cars go?"

It can be clearly seen that boulevardization as an alternative would not have easily surfaced, possibly even in a systems analysis type of assessment of alternatives. The expert views help also to showcase why City of Espoo did not investigate the boulevardization for its costs and benefits as requested. It simply was not held as a plausible solution. Some of the questions and concerns of the experts are answered here in the following section 5.11., based on the City of Helsinki assessments of boulevardization of incoming freeways. A leading thought is that regarding accessibility, also for private cars, the closeness of trip targets is generally underrated and the vehicular speed overestimated in planning.

Figure 27: Land use proposal for the Länsiväylä boulevard in Lauttasaari, Helsinki (City of Helsinki 2014b).

Many of the participants derived a comparison from the Mannerheimintie or other similar densely built streets in Helsinki. According to some interviewees, that kind of environment would not be accepted in Espoo. Many noted that they would not want to live by Mannerheimintie or a

boulevardized Länsiväylä. In one contrasting view, though, an interviewee noted that many of their friends want to live by Mannerheimintie, because "you can get anywhere from there".

The main argument against boulevardizing the Karhusaarentie road in Keilaniemi on Ring Road I was that the amount of traffic now and in the future would not be possible to go down the road in case it was turned into a boulevard. Also, it was often mentioned that the emission rates and noise levels would be too high to justify building houses, even in the case of boulevards. It seems not be possible to build streets like Mannerheimintie, Mäkelänkatu or Huopalahdentie in Helsinki due to pollution and noise-related safety regulations. It was also often noted that the boulevards would not make a very agreeable environment. Justification for the boulevards not being feasible is here recounted at length in order to cover most of the opposing aspects for boulevardization:

> Expert B: "But there are the emission and noise restrictions. Noise is maybe easier to be controlled. We can build certain kinds of [houses]. But you cannot get a pleasant living environment there. --- I don't know if it would be good city planning to build on side of a busy thoroughfare. I wouldn't want to move there. In a way you would need to find a lot of other solutions for traffic and make driving so difficult that you don't drive much there. --- In some way I think there are so many things related to boulevardization which would need to be solved first. Before we even can start discussing. It is kind of childish discussion, saying let's make this a boulevard. What does it mean?"

> Expert N: "Of course it could, could be- but, the traffic volumes are so big, that I doubt myself that it would work here at this place. That you would get a pleasant environment and all the traffic enclosed there next to it. And then, in housing, even though we would accept that center- in a way in a downtown environment, which this will be little by little maybe someday, that the air quality is then lower. So I do feel that we wouldn't place houses next to that kind of route of heavy traffic."

> Expert J: "So many times that boulevardization has been discussed in the forums, where-there are sort of experts from the transportation planning side, so I have understood that the functionality, the capacity of a boulevard has so far not been sufficient, so that it would be a relevant or a real alternative. If that is true, so then it has its problems. And another thing, which is of course hard, is that when at the same time we make plan development for smaller routes, there are actually two problems: noise and small particles. Noise we can cover with structural means quite well today, for certain parts. But particles as far as I know we can't. And there is a big conflict between boulevardization and those particles. The bigger the traffic volume, the more we have the particles and the farther we should build from that transport corridor, and then it is not a boulevard, then it's something else."

> Expert L: "Boulevardization is I think that kind of thing that you have to study quite a lot. Because.. it is such a green solution that sounds great, but how does it work for transportation, I think that has not been studied enough. Another thing is, this spot exactly, like I said, this is one of those thoroughfares that is a ring road where the traffic volumes are growing. And then if we started bringing down speeds and planning it for a different type of traffic from what it is now, then it doesn't work. You have to have these arteries which flow smoothly. And as reliably as possible with a big capacity. --- And one importance of this is that heavy traffic comes this way. Because you cannot go to the harbours via Mannerheimintie, the port traffic is steered from here. And the port traffic and the heavy traffic is surprisingly big, because it happened so that when the Vuosaari harbour [outside of the inner city of Helsinki] was made, the shipping concept changed to something different from what was imagined. You see, the [passenger] ships to Tallinn they are actually cargo carriers which have some places for entertainment. In which case quite a big share of the truck logistics in Finland go through the passenger harbours and not Vuosaari.

In which case this is important as a logistics link. And I think there are quite a lot of exactly these security issues involved."

Expert A: "Well of course these kinds of plans should not be commented on hastily, you have to study them a bit and so on. But this of course has to, in my view to contain that kind of strong assumption that car traffic decreases. And if it decreases, if it materializes, then it can be OK. But in a traffic safety sense, if I compare this quickly to the present situation, then every one of these pedestrian crossings is a dangerous place. --- Like as a small child you must remember you played with water dams, when water in the spring came from there, you made dams. If some route was banked for example there, so it quickly went to somewhere else. So we should, not just draw these kinds of nice architectural pictures, but also tell us at least what the traffic volume is there, there, there and there. --- For example I just looked it up for a presentation from the past ten years, so there have been three thousand six hundred new residents in Espoo on average during ten years. And it has continued at least- and it continues. It has been agreed upon, and you know. So if at some place radically you constrain on this kind of main- this can be now called a blood vessel or what is it, a vessel of the region, so if you all of a sudden constrict it radically, so what does it really mean?"

Expert D: "Well in principle of course they are very much something to root for, and those, they have been proposed decades ago, but… it is so that experienced both transportation and land use planners are sceptical. For example Pentti Murole, who has advocated for these in the previous century, he also sees, sees them more like a bit optimistic misconception than reality. That is because- related to an optimist- on the other hand to the movement capacity and – the denser we build, the more movement we need. It creates, be it mass transit or active transit mostly, there is still traffic on rubber wheels. – But maybe the bigger challenge is this healthiness and pleasantness of the environment. If there are from thirty to forty thousand vehicles moving, so even though they'd be pretty trees and nice outdoor terraces, it wouldn't be an attractive environment anyway. So you have to create it somewhere else after all."

Expert M: "Well, if you compare a motorway and a boulevard transportation-wise, so in a transportation-related sense there is no point. Because, first comes this question of safety. If you have a motorway, you have two- the cars are driving that way separately and this way separately, there are no crossings. --- Then if we make a boulevard, you have level crossings, the throughput is much lower. Then you have junctions with lights, which cut the flow, and then the traffic gets jammed, and by consequence it spreads to the lower street network and creates those harms and safety problems and others there. --- And then there are of course these, these harms that the traffic causes, if we think that we build new buildings close to the thoroughfare, that is one thing that I just didn't understand, how you would fit that to any environmental regulations, since in planning safe and healthy living environment is required, so you bring in a way living to that harm corridor. How would those be managed then? So, I don't understand that ideology at all, I think housing should be taken care of – for example by these kinds of tower buildings built at metro stations (laughs)."

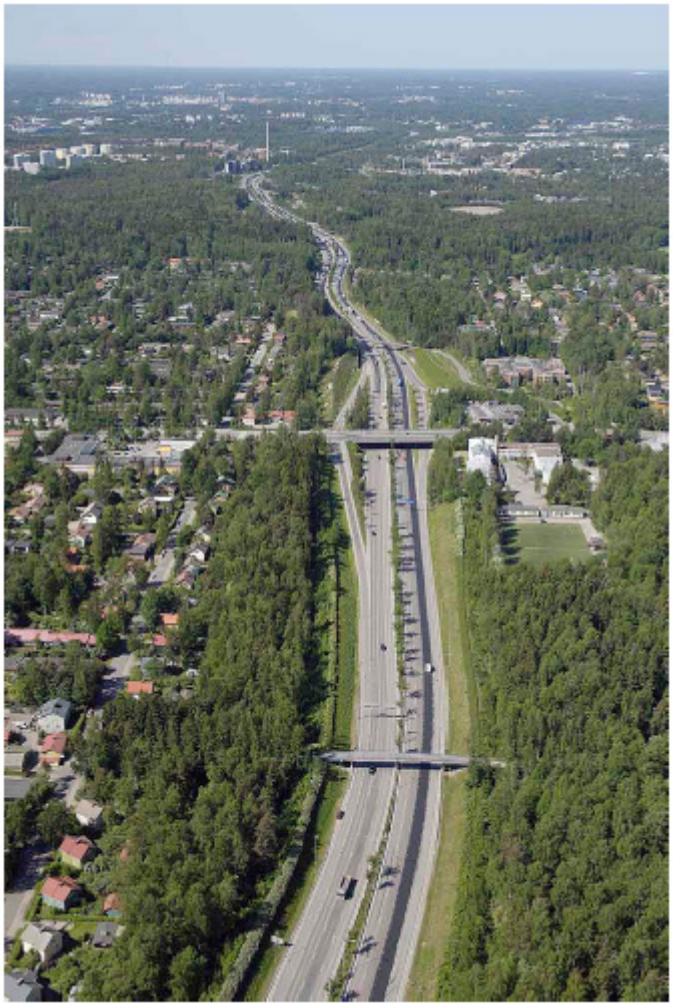


Figure 28: Ring Road I in Helsinki near Pakila and the Pakilantie street (City of Helsinki 2013b).

There are many uncertainties and questions to be answered regarding boulevardization. Some of the claims presented in the previous interview extracts will be contested in the following section. One of the most serious considerations regarding boulevardization are the emissions of air pollution and small particles, which are hard to be prevented. Discussion and studies are needed regarding those. Still, it is not possible to go into a lengthy discussion here on the harms that they cause. Certain possibilities, however, would offer means to reduce the small particle exposure in the forthcoming decades, such as electric cars, studless tyres and better cleaning of streets and air filters in buildings. The Helsinki Region Environmental Services Authority HSY has drafted a report that deals with several measures in different areas, which can be used to prevent the creation and the harmful effects of small particles in the living and transportation environment (HSY 2014; Kauppinen 2013). The Uusimaa Centre for Economic Development, Transport and the Environment (Airola and Myllynen 2015) has made a guide on air quality in land use planning. It deals with the current legislation and enactments, the assessment of air quality and design solutions where air quality has been taken into account.

Here the boulevards are brought forth as an alternative, like a radical adaptation as suggested by Giezen, Bertolini and Salet (2015) or as part of the problem analysis that would take place in the beginning of a systems analysis before a major infrastructure project. Preliminary studies on boulevardizing the incoming freeways in Helsinki have been made, as the City of Helsinki has addressed the issue for its master plan work during the recent years.

As for some more detailed notions, it became evident during the interviews that planning streets in Espoo does not favour building long straight roads, because driving speeds may then be too high. Roundabouts would help to restrain the speeds and enhance safety, but they would not necessarily be suitable for such a busy streets like the ones that the Helsinki-type boulevards would be.

In spite of a generally sceptic stance against the boulevards, they were regarded clearly generally positively in at least two of the interviews. Boulevardization here is a means to provide more housing with no severe consequences for traffic, something which is also addressed in the following chapter:

> Expert E: “Very good, in that case- in that way they [in Helsinki] will get more land for building purposes. In that case, I have seen these predictions how boulevardization affects for example the accessibility of work places, it reduced the average commuting time, because then we would get more people next to work places then. For people in Espoo it is not- I know that in Espoo really strange things have been said about the boulevardization,

because the people don't understand what it is about at all. --- For the people in Espoo it has really small significance transportation-wise, but what is interesting is what significance it has for housing policy. If they [in Helsinki] can actually make an important amount of infill development that is started with a rapid schedule, which provides living close to services. We are really in trouble when we start to think that we try to build something more like an urban downtown even at a metro station. Do people want to move there, if at the same time there is something for offer much closer to the Helsinki center? --- But it's worth noticing that this would be like infill development at Mannerheimintie, Mannerheimintie neither is the kind where nightingales sing and squirrels jump happily, but it's a dense thoroughfare, there is lot of development, but for one reason or another I too have friends, who want to live there. You can get everywhere from there. --- But so, what needs to be done in boulevardization is transportation modelling and plans. You have to look at how much traffic there is, what it needs, what is the capacity. So you have to have the courage to do that, if we have a metro station and the metro station has to be made good use of. That has to be taken into consideration in the calculations. And that's a kind of thing, when you have done that, so then we are a bit wiser already. But certainly you have to be… the scenarios are also a bit self-fulfilling, you cannot have more cars in an area that is the capacity, but then of course it has to be made sure there are alternative means of transport. Here there is the metro now. --- But I don't actually, if you forget the groundless fears and also the grounded fears, so after that we only talk about that in the decision of principle that- What prevents I think is that, if we don't see how much we can affect the environment, how much we can build there and what kind of environment it will be. But, if we can prove on some level that traffic will work out, so then also many fears will be subdued."

5.11 Boulevardization in Helsinki as a reference point

The City of Helsinki boulevardization example is here used both for practical and general reasons. It can be deduced that the Helsinki Metropolitan Area in practice works as a single city area. For the general picture, according to a recent account, 37 % of workforce in Espoo goes to Helsinki for work (City of Helsinki 2014a). According to Næss et al. (2013, 477) the characteristic found to exert the strongest influence on travel behaviour is the location of the dwelling relative to the main city center, as regards residential location within an intra-metropolitan context. Næss et al. refer to studies in a number of cities in the Nordic countries and elsewhere showing that inner-city dwellers tend to travel shorter overall weekly intra-metropolitan distances and carry out a lower proportion of their travel by car than their outer-area counterparts.

In practice the extension of the downtown area in Helsinki affects the nearby eastern Espoo areas as well, making them still more attractive for dense city development. Also in general after the proposed Länsiväylä boulevardization until the Helsinki-Espoo border, the areas in Otaniemi, Tapiola and Keilaniemi will be in the next future sphere as candidates for further extension of the region's downtown areas.

A city of Helsinki Transportation Planner was interviewed for this study. The following extracts from expert C characterize the aspirations and premises of Helsinki in their boulevardization plans:

"And then when you look at the map, so you can see that Länsiväylä, it is the only one of these incoming thoroughfares that comes so close to the center of Helsinki as a motorway. And now, what affects this a lot is this completion of the western metro. In the 2016 the western metro gets completed, it is there in the Länsiväylä corridor. It offers then a good, a fast alternative to come to the center of Helsinki. So in that sense the capacity of Länsiväylä can decrease a bit. And we have made a study by a consultant how it affects in different alternatives, so there are four alternatives depending a bit on how strongly it is

> boulevardized. There, in the most street-like alternative it is about four minutes that the driving time from Keilaniemi there to Salmisaari grew. So it slowed for that amount. It is not a dramatic slow-down yet but. And of course it is because there would then be junctions with traffic lights that there aren't now. But then again, that traffic it always gets congested there at the end of Länsiväylä, every morning at the intersection of Porkkalankatu - Länsiväylä. It is the capacity of the intersection that determines what gets into the street network of Helsinki. So even though you make those kinds of at-grade intersections there, it doesn't necessarily change much that incoming capacity. If you don't do anything with that intersection of Länsiväylä and Porkkalankatu.

As is seen in the previous comment, the boulevardization of Länsiväylä in Lauttasaari in practice does not change how fast one can get to downtown Helsinki, since it is the intersection on Porkkalankatu and Länsiväylä that determines the incoming capacity. During the rush hour, the queue waiting to get to the inner city of Helsinki would only locate further west along the Länsiväylä boulevard.

> Interviewer: "Right. So Länsiväylä is a favourable [road to be boulevardized], because you will have this western metro in the same corridor, and also that it is, it comes that close to the Helsinki downtown if I got that right?" Expert C: "Yes, it's a bit, it doesn't anymore- let's say this boulevard thought has started from there being this city structure, let's say in the 1900th century you still had here, when Kruununhaka here was the center, and then a hospital and a cemetery were build there in Lapinlahti. So they were built on the edge, you had that kind of forest in between here in Töölö. So they were not there in the city structure. It was wanted that the deceased and the mad people were a bit farther away from ordinary people. But the city structure has grown so that that area is right in the middle of the capital region. So it is a certain thing when the city structure expands, the road network has to adjust to that expansion. Länsiväylä is there, quite severely inside this city structure already. And what is maybe the most important thing in Länsiväylä is that in the future we will be in shortage of these new project areas."

Boulevardization is the extension of the dense core-city structure by turning the incoming freeways into city streets. Consequently, if the terminology is followed, the development that is seen as boulevardization also in Espoo should include outward extension of denser downtown-like areas.

As expert C from the Helsinki Planning Office recounts, the motorways that exist inside the city structure have been designed in an era when Helsinki was much smaller than it is now (City of Helsinki 2014c, 19). Boulevardization essentially is scaling down the incoming roads and thereby extending the dense downtown areas outward from the city center. These city boulevards would be centrally located – contrary to what was the conception of one of the interview participants during the interviews. The growth in population in central locations is also one of the prerequisites for the light rail based networked city that Helsinki is aiming at.

> Expert C: "But certainly the whole boulevardization system is based on that the share of transport modes also change, it is not only… in a way this capacity, but also the transport mode share, which means that. That all the less people would come to Helsinki headland or the center of Helsinki with private cars then. But it necessitates that there has to be a good level of public transport. Of course the western metro now improves that western direction, but also all these boulevards, that are these Vihdintie and Hämeenlinnanväylä, Tuusulanväylä, it is that there is always that trunk connection of public transit. It would mostly be light rail that would be serving there."

This kind of well networked city that Helsinki is aiming at also would support the local centers within the city structure in services, economic life, recreation and public and active transit modes. The report on city boulevards (City of Helsinki 2014c, 22) notes an example of a freeway downsizing of a similar

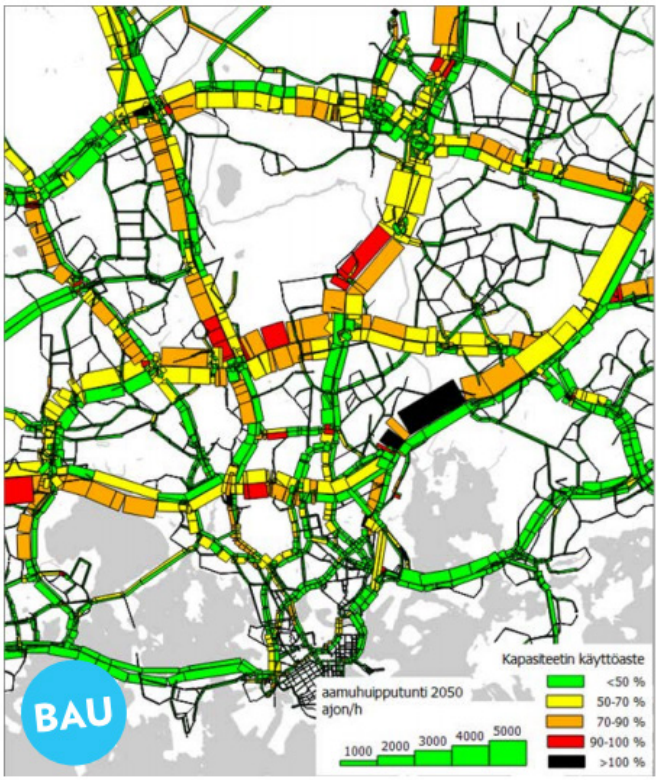
scale in 1991 in San Francisco, where the value of real estates in the surrounding boulevard area increased several times as high as before. Equivalent highway removals or freeway downsizings have taken place for example in Toronto, Seoul, Vancouver and Paris, or as in a recent example, Vancouver (Robinson 2015).

It seems that the boulevardization discussion has perhaps gotten the players and experts in transport and land use planning off guard. This is reflected in the assessments that have been quoted in the previous section. The boulevards were seen as unpractical, "not from this world", unsafe and harmful for health. Boulevardization is a solution that could be taken into account when considering all the possible solutions to a problem, as an alternative in the systems analysis approach. The interviews revealed a need to continue the discussion of what city boulevards are and what they are good for, what their impacts are and what the alternatives. Boulevardization considerations are, however, a too complex area of analysis to be fully looked upon here. Hence, only some considerations are briefly examined.

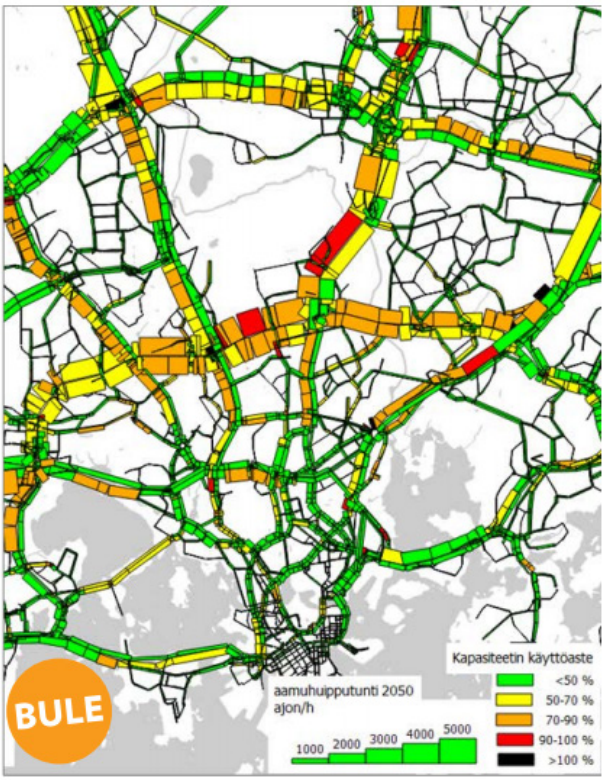
In a report for a goal-oriented impact assessment (Tavoitelähtöinen vaikutusten arviointi, City of Helsinki 2014c, 8), the City of Helsinki estimated whether the city boulevards that relate to the new Helsinki master plan support the goals made for the plan, and more generally the goals related to the region's development. The new city structure that will be created by the city boulevards increases the number of those fields of business that benefit from urban environment and urban concentration. This means that the boulevards would then create new kind of business life and jobs in Helsinki, which would not likely be created in a more dispersed future scenario (City of Helsinki 2014c, 8-9). The report notes also that companies locating in Helsinki, central Vantaa and in Leppävaara in Espoo would have it easier to recruit workforce, which would support the companies residing in those areas. According to the study at hand, public transit, cycling and walking would become more competitive transportation modes compared to private cars. It is also noted that boulevardization would not cause significant congestion.

One of the key issues of boulevardization for the interviewed professionals was the impact that boulevardization would have for car traffic. It was suspected that should Ring Road I in Keilaniemi for example be turned into a boulevard, the amount of traffic would, according to some assessments, have to be decreased by half. To comment on the transport-related effects of a city boulevard alternative, changes in accessibility are of importance.

The effects that boulevards have on transportation were assessed in the Helsinki City report (2014c, 55-72) by the so-called HELMET transport model developed by the Helsinki Region Transport HSL for the Helsinki region. The report distinguishes between two scenarios; one where the radial motorways are not turned into city boulevards (the BAU, or business as usual, alternative), and one where they are (BULE or boulevard alternative). According to the model, there would be from 5 to 20 % less car traffic in the BULE-scenario than in the BAU-scenario during evening rush hour. Considering daily use the difference in vehicle kilometers travelled is about 6 %.



Kuva 22: Liikennemäärät ja liikenneverkon kapasiteetin käyttöaste aamuhuipputuntina v. 2050, BAU-skenaario

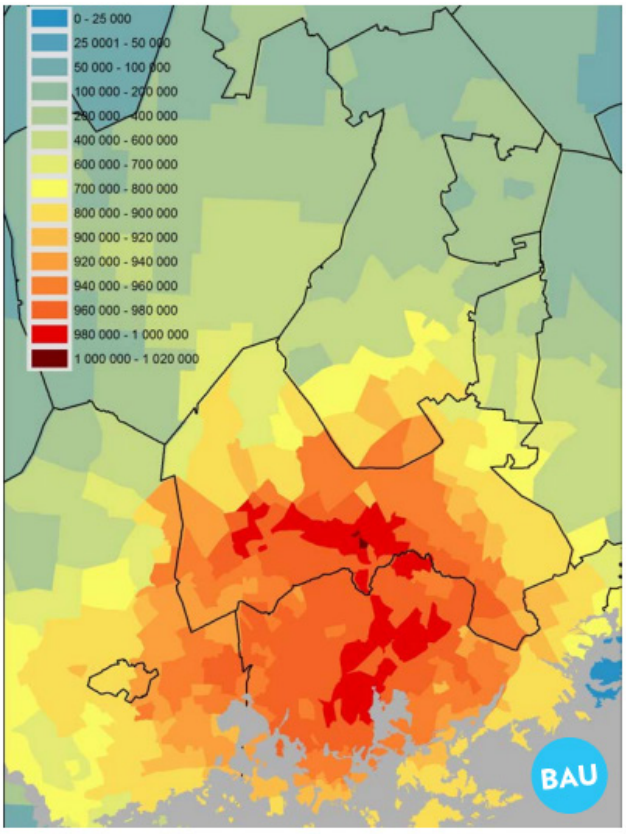


Kuva 23: Liikennemäärät ja liikenneverkon kapasiteetin käyttöaste aamuhuipputuntina v. 2050, BULE-skenaario

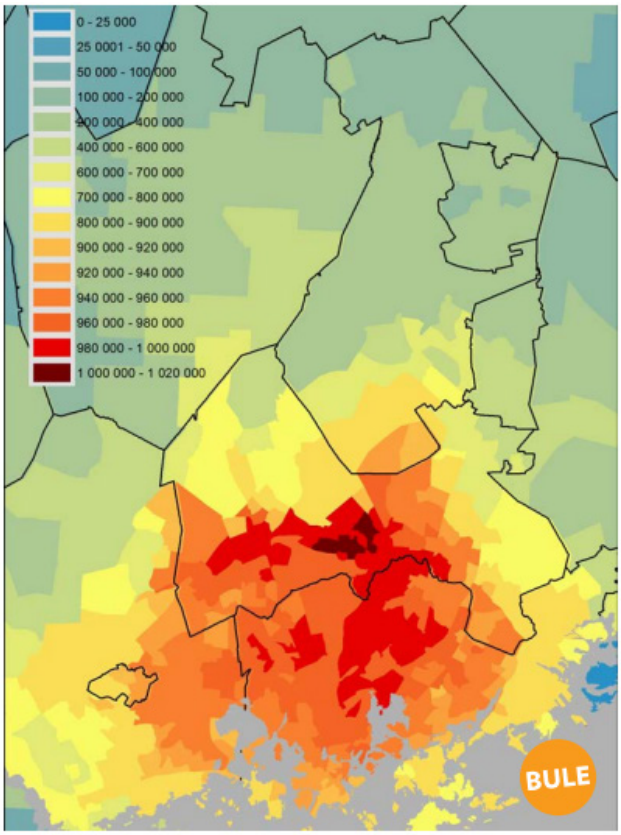
Figure 29: Traffic amount comparison for 2050 in Helsinki in the business-as-usual and boulevard scenarios (City of Helsinki 2014c). The picture shows the vehicle count in one hour during the morning rush hour. Sections in green show capacity use of under 50 % of the maximum, whereas red from 90 to 100 % of the maximum capacity. In the boulevardization alternative, congestion is lower, though in many places the two alternatives do not significantly differ from each other.

A boulevardization alternative was criticized in the interviews by at least one participant on the grounds that the same-level crossings would be unsafe for pedestrians and cyclists. According to the report on boulevardization (City of Helsinki 2014c, 62) and based on the transport model study, in 2050 in the area of the 14 Helsinki region municipalities there would occur 1391 incidences resulting in personal injury in the BAU scenario. In the BULE scenario the number of accidents is 1355, which means in the boulevardization alternative there would be 36 collisions less resulting in personal injury. Based on current costs for accidents in road traffic, the saving compared to the BAU scenario would be 13 million euros a year. This result is accounted for by higher amount of car traffic in the BAU alternative. Thus, looking at the risk levels of one particular street is not enough, if one wants to decrease traffic accidents in a metropolitan area. In practice detailed street planning and traffic management makes or breaks the traffic safety.

The interview participants were wary of the claimed congestion that a boulevardization scheme would bring about. This concern echoes a belief that the general accessibility in the city region would diminish. In general it can be said that accessibility has a central effect on the evolution of city structure. Increase in accessibility raises the demand for a particular area and creates a new kind of need for novel land use. Often this means densification of land use and the society's functions. Typical for a networked city is the densification in the development corridors between the local centers. A remarkable effect the freeway downsizing has is the improved immediate accessibility on the sides of the city boulevards. Barrier effect is removed and new local roads are introduced on the sides of the boulevards, increasing accessibility when the areas' street network become more continuous.



Kuva 35: Työpaikkasaavutettavuus henkilöautolla 30 minuutissa aamuhuipputuntina BAU-skenaarioissa



Kuva 36: Työpaikkasaavutettavuus henkilöautolla 30 minuutissa aamuhuipputuntina BULE-skenaarioissa

Figure 30: Accessibility of places of work by private car during morning rush hour in the business-as-usual and boulevard scenarios (City of Helsinki 2014c, 66). The numbers in the legends show the amounts of work places reached from a particular location.

Accessibility describes the complete whole of the land use and the transportation system, combining the target of moving to and the opportunity to move. The denser the land use is, and the more functional the transportation system, the better the accessibility is for someone living and working in the area. Accessibility also affects which transport mode is used; if the destination is near, it is natural to walk or use a bike. A well-functioning transportation system enables making even a longer trip competitive related to using a car.

According to the Helsinki City report on boulevardization, residential accessibility by car improves significantly in the zone north of Pasila in Helsinki, where the city structure densifies and the transversal connectivity increases. The report states that accessibility increases in the zone extending until Leppävaara. For bicycling the increase in accessibility is bigger than for car transport and public transportation. In the model the residential accessibility, which means the amount of people accessed in thirty minutes, is still twice as good by a private car compared to public transit or bicycle. In the Helsinki capital region, over one million places of work can be accessed with a private car from the most central places in the area (figure 30). The accessibility to places of work increases almost everywhere in Helsinki in the BULE scenario compared to the BAU scenario.

The study on city boulevards expects 100 000 new residents along the current motorways. 80 000 of those would locate outside of Helsinki if the boulevards are not realized, it is expected. The Helsinki city study (2014c) expects also an additional 50 000 work places. The city boulevards provide homes for a significant share, 30 %, of the new residents in Helsinki in the future, thus contributing to the planning objectives in the region in a considerable degree. One reason for the claims that the boulevards would hinder moving about in the city is the reduced traffic speeds along the boulevards.

The driving times through the boulevards would increase by one to three minutes, according to Helsinki City Planning Office representative, and at the most four minutes. However, the delays caused by congestion would be bigger in the business-as-usual scenario that leans more on car-based transport. The biggest benefit of boulevards, though, is the improved accessibility compared to the alternative. Since the population number in the region and in Helsinki is likely to grow in any case, the two different futures have to be compared.

Accessibility presents an overlooked fact that probably even the interviewed experts failed to consider. If one accepts the fact the actual travel speeds along the current motorway decrease, boulevardization provides a desirable alternative for city development. Attention needs to be paid to distances to places of work and homes. Pace of movement one is capable of exactly seems secondary in importance when considering the essential characteristic of a city region: that is how easily any number of places can be reached from a given location. In public discussion the oversimplification of transportation planning is certainly more prominent, underlining the need to highlight the complex interaction of land use and transportation in city planning.

6 RESULT SUMMARY AND DISCUSSION

6.1 Keilaniemi land use and transportation planning

The object of study in this thesis has been the planning solutions for the project in Keilaniemi, Espoo, and the capacity to make adaptations to planning solutions and devise alternatives for planning. The specific case here is the tunneling of Ring Road I running through the area and the building of four high-rise residential buildings on the road side. The study has looked at what has been the capacity to make either incremental or radical adaptations to the plans when deemed necessary. Also of concern has been the effect of path dependence or the prospect of providing alternatives for development at the outset, to raise the project's capacity to adapt to changing circumstances and when facing difficulties.

Document analysis and interviewing personnel belonging to the key stakeholders regarding the project show that the history of planning to mitigate the barrier effects and noise and pollution caused by Ring Road I between Otaniemi, Tapiola and Keilaniemi dates in its essential solutions back to the 1990's. As evidenced by the planning documents and the city representative bodies' minutes, the basis of development has, from the start, been putting the road underground, a choice which seemly has not been contested at any point of planning. From the Apila model of 1996, as planning has progressed, the length of the combined tunnels has decreased with escalating costs. In retrospect, the early tunnel visions can be seen as having been over-ambitious, though the increasing safety measures for road tunnels have in time contributed to rising costs.

Planning documents and Espoo Planning Board, City Board and City Council meetings minutes, and the expert interviews, draw broad outlines of the formation of planning that has taken place. Planning focus shifted little by little between 2005 and 2011 from the Hagalund area to the adjacent Keilaniemi metro station area. Many reasons contributed to this shift, including the strategic thinking of the role of this area in Espoo, and especially the progress in development of Länsimetro.

The Keilaniemi project shows the effect of increasing returns in a case of path dependence. In the specific plan of the four residential towers and the road tunnel, several ambitions coalesced. On the other hand Keilaniemi was seen as an increasingly desirable place for residential development, because of the western metro extension, the role of Otaniemi-Keilaniemi cluster in promoting business and knowledge environment in Espoo, and the sea-side location of the area. There was a desire to connect the areas of Otaniemi, Tapiola and Keilaniemi more tightly together, and the construction company SRV as one stakeholder came up with a plan of introducing suitable high-rise residential towers in Keilaniemi.

The Hagalundinkallio tunnel solution itself faced an incremental adaptation by the planning solution having been changed from an excavated rock tunnel into a concrete shield cover on the current road site. The driving reason behind the Hagalund shield adaptation, both according to the interviews and the planning documents, was that it permits a road entry from the Tapiolantie street to Ring Road I, which in the rock tunnel option would have been unpractical. A concrete deck, however, enables less building on the Hagalundinkallio hill, thus probably making it financially a less feasible alternative. The costs of providing the connection should be weighed in comparing the building space made possible by either an excavated rock tunnel or a concrete deck cover.

A specific contradictory issue in planning in the spring 2015 was the planning solution for the Tapiolantie - Ring Road I on the Hagalundintie intersection. The state did not want an at-grade intersection such as is the current Tapiolantie - Hagalundintie intersection, after the Ring Road I

tunnel and the grade-separated roundabout between Keilaniemi, Otaniemi and Tapiola have been built. Although claimed by the interviewed transport planners there being no considerable risk, the state officials were wary of the risk of queues of cars at Tapiolantie-Hagalundintie intersection extending to the tunnel, in which case traffic to the tunnel would have to be halted. The state and city negotiations ended to a result that at the latest in 2020 Espoo will start planning for a grade-separated bridge solution in the Tapiolantie and Hagalundintie crossing. This connects the Hagalund planning to the planning of the Keilaniemi area.

The planning of the Keilaniemi road tunnel provided some clever incremental adaptations to reduce the development costs. Reducing the development cost was paramount because of the Espoo City Council decision that construction of the road should be done by funds gotten from selling the plots for the residential towers. By discarding a pedestrian overpass of Valokeila at the Karhusaarentie section between Keilaniemi and Otaniemi, it was possible to raise the alignment of the tunnel by five meters. Also it was discovered that the maintenance spaces that were intended between the tunnel and the surface could be repositioned to the sides of the tunnel.

Although planning for Keilaniemi provides many examples of incremental adaptations during the preliminary planning, no radical adaptations during the planning phase of the project were made. The largest incremental adaptations were the raising of alignment of the road tunnel which contributed to lower excavation costs, and the decision to implement the project in phases, which on the other hand reduces all participants' risks, but also adds to the rigidity of the plan by creating a hard to escape procedure to follow through. By opting for the tunnel, both transportation and residential development is achieved from the point of view of their initial goals and objectives.

Some of the interviewed experts specifically voiced a positive attitude towards making adaptations during planning. It was, for instance, seen that solutions usually improve by working them. Also it was expressed that an approach similar to systems analysis, where alternatives are compared for their costs and benefits, would be itself beneficial in planning big projects in Espoo.

As a case the Keilaniemi planning project offers some diffuse insights that are of relevance for planning. In Espoo, an investor-led planning seem to be a norm more than elsewhere, for example in Helsinki. This is partly because Espoo owns little land within its borders. The initiatives of private developers also help the limited planning resources of Espoo. This kind of more on-demand planning, however, may make planning more reactionary in nature, leading to a situation where what is actually strived for on part of the city is not properly assessed. Having a private developer on a driver's seat in planning can also be seen as a choice of not pushing wider perspective in city-wide development.

The interviews with experts saw the Keilaniemi plan very favourably, achieving residential development at the Keilaniemi metro station which otherwise would predominantly be used for work trips. The interviewees considered the plan an improvement for pedestrians and cyclists, although the deck covering the tunnel does not add to the pedestrian and bicycle connections in the area, and although the road can be seen still presenting plenty of barrier-effect. Considering the ensuing city structure the Keilaniemi plan actually fails in the fundamental goal of the plan to integrate the city structure in the Otaniemi-Tapiola-Keilaniemi area. The plan in question retains more or less the same connectivity between the areas, adding only to fluency of car-based transport and the pleasantness of environment of top of the deck for bicycling and walking.

In the analysis the conceptions of the experts are covered in detail. It is intended that the accounts based on planning documents and meeting texts, and the interview analysis provide a comprehensive view of the Keilaniemi undertaking. A specific characteristic of a case study is to be an explorative

account of how the events unfolded and what kind of choices were made for which reasons. By and large, the most challenging planning aspect as estimated by the experts were the road and transportation planning.

As it transpired in the interviews, covering a thoroughfare like a road or rail tracks, is a costly way to introduce building places. This naturally undermines the financial feasibility of such projects, especially compared to alternatives where no tunnels or such speciality structures are used. Requirements for safety bring about considerable physical structures and safety management measures. Building tunnels in general and building houses and offices on top of them is expensive, and even offsetting the construction costs is a hard task to achieve.

In the thesis the Keilaniemi planning solutions for the road and the towers were inspected and analysed. Should a systems analysis approach be taken up in planning in Espoo, conceivably a large-scale infrastructure project such as the Keilaniemi undertaking would have had different alternative solutions assessed on a rudimentary level in the beginning of the project. This did not happen, for one thing because there was no clear point of time when the project was initiated.

In Keilaniemi the tunnel and towers plan has met considerable concern for its financial soundness after the approval of the local detailed plan in May 2012. In one council question after the plan approval the council members urged City of Espoo to investigate an alternative of not building the road tunnel, but instead turn Ring Road I into a city street and build on its side. The comparison for the costs and the amount of new building rights was not actually made. This verifies that in the Keilaniemi project, too, definite path dependence has been in place, and that the requirement of account for an alternative solution came too late in the project. Some of the positive and negative aspects of the boulevardization prospect have been presented in this thesis based on the Helsinki master plan proposal. The interviewed experts' opinions on the city boulevard measure have been quoted at length as well. In all likelihood the boulevard alternative would provide drastic financial benefits for the City of Espoo as well.

During the expert interviews the opinions of the interviewed stakeholders on the city boulevard measure were assessed. The interviews demonstrate that attitudes towards boulevardization as an alternative are critical. A boulevard in the context of Keilaniemi was "out of this world" in the views of the experts. The most severe obstacles were seen the fluency of traffic, the liveability and safety of such a city boulevard and the health concerns for noise and particles.

The City of Helsinki boulevardization studies in its master plan proposals gives cues for Espoo regarding boulevardization measures. The Helsinki vision of boulevardizing the incoming freeways and extending the denser downtown areas affect Espoo in practice as a city as well. Boulevardization as a measure increases the access to jobs and work places in Helsinki compared to the future where boulevardization has not been done. This amounts to better safety and differences in travel modes used. It can be deduced in the light of the Helsinki reports, that many doubts of the practicality of boulevardization are ungrounded.

The Ring Road I tunnel development, in addition to providing building plots on its side, is an undertaking to increase the fluency of the road and to meet the required road capacity in 2035. The aim in planning has been that the road would still be uncongested in 2035. Since the state of Finland owns the road areas, the particular planning measurements and dimensions for the Ring Road I development in Keilaniemi are the responsibility of the Uusimaa ELY Center. Ring Road I in Keilaniemi was planned based on the state's exigencies. The interview round showed that Espoo, had it been left to its own devices, would have perhaps settled on lighter solutions. During the interview

round, criticism was expressed for the Espoo responsibility of paying in a situation where the exigencies for planning have come from the state.

The responsibility of developing the current state roads is a profound question, and is elaborated in the analysis. Even though the ELY centers and the Finnish Transport Agency take care of the functioning of the state roads within large city regions, it is justified that cities would have both the capacity and the interest to ensure the accessibility within their borders and regarding the surrounding region. Also, when seen solely as a transportation planning issue, road planning does not take into account the effects it has on land use planning and house provision. As is seen in the sections handling the question of boulevardizing the incoming freeways in Helsinki, a future boulevardization provides better access to homes and work places even for those using private cars, compared to the situation where the incoming freeways have been left intact. It has been suggested here that there should be a move to a lump sum contribution in transportation planning which the cities could decide themselves on.

6.2 Discussion and conclusion

There should be a distinction between the case itself and the object that has been studied (Laine, Bamberg and Jokinen 2007). In this case the object has been the process of planning and the planning solutions taken. What other objects of study would there have been? That is to say, what else could the Keilaniemi case be a case of? It can be argued that the thesis would have benefited from focusing more closely on the more specific questions that came up and were seen relevant within the Keilaniemi case. These topics could be further studied. Such is for example the joint planning of road and land areas by the City of Espoo and the state bodies in charge of developing the state roads in the city areas. The questions in that case are where should the boundaries of each jurisdiction lie, and for example who should pay for the development. Although not necessarily clearly expressed, it is evident that the differing planning views and priorities were the cause of the severest conflicts in Keilaniemi planning.

The study was designed in the beginning to cover aspects that were seen holding general relevance. Another topic of general relevance, that should be discussed and explored further, is covering roads with shield covers and thus putting them into tunnel. These are often suggested in the hope of making good use of the space on top of them. They are, however, very expensive endeavours where money obtained from land sale could be used elsewhere.

The planning solutions determined for the Ring Road I development favoured planning for the road speed and capacity more than perhaps Espoo would have liked. Another profound question is the planning for speed and capacity of road transport and, on the other hand, for density and accessibility within larger Finnish cities. In this sense the inspection here could have been even more closely in the interrelatedness of land use and transportation planning, how one affects the other, and in what way the Keilaniemi plan more broadly affects land use in the HMA.

Yet another theme that could have been given deeper thought is the more distinctly investor-led planning in Espoo compared to at least that of Helsinki, and its implications and consequences. To keep the scope of analysis still in the realm of land use and city planning, the Keilaniemi case of course could also have been strictly handled as a case of real estate planning. For instance, which factors would make the Keilaniemi towers' apartments desirable for prospective buyers and what this means for land use and planning?

There is a confidence that the Keilaniemi planning case reliably touched the relevant issues, or objects of study, within the case. However, admittedly from the start there was an understanding of the most

prominent relevance, or the crucial stumbling block, that affected the Keilaniemi road and city planning and development. Already before in practice starting working on the thesis, the planning characteristics of the Keilaniemi project were visualized for a separate project, as noted in the section about methodology, to shed light on how to reduce the development costs. The financial limitation was that too much was needed initially to implement the tunnel plan and too little was to be gained by introducing building rights on the tunnel side. This applied to the situation in the Hagalund area as well as in Keilaniemi.

This basic conflict found in the Keilaniemi case guided the interview gathering phase too, despite the aim for an inductive analytical disposition. An alternative for solving the financial puzzle that Keilaniemi presented comes also readily to hand. This is showcased by the urban blogger Tolkku (2012) in a comment about the Keilaniemi plan, criticizing the Keilaniemi plan without inhibition. The experts were asked about a prospect of boulevardizing the Karhusaarentie road in Keilaniemi, since it is a measure to convert the state road to a street and acquire plenty of land for development, with a lot of less spending on road building. The chosen theoretical standpoints of systems analysis and adaptive capacity were aimed at supporting the focusing on planning alternatives, the expenses and the road and land use planning solutions.

Keilaniemi is seen here as a typical case providing general understanding of the interrelatedness of land use and transportation planning. There are limitations in each research case, and another cases would provide other points of view and different understanding of the theory of land use and transportation planning. As considered in the methodology section, in a sense Keilaniemi also can stand as a critical case. If building for a road cover cannot be sustainable in the proximity of the Helsinki city center with a seaside view and next to a public transport trunk connection, it is hard to envision the kind of plan to be feasible anywhere. Of course, an entirely different question is whether there is a point in measuring the viability of a transportation link for the added building rights it can produce. The tragedy of the Keilaniemi case ultimately is that a necessitated transportation option is aimed at being paid with the land use income, when the transportation link is rationalized by the regional benefits.

A researcher should, according to Laine, Bamberg and Jokinen (2007, 26) think how specific material helps to answer to the posed research question. Accordingly, the use of methods should be in line with the data, and the data should be gathered keeping in mind the research question. In hindsight the gathered interview data threatened to be not of use in answering the research question about the planning solutions and chosen alternatives. The interviews did certainly generally probe for justifications for the solutions and the unfolding of events, but the experts were not specifically being asked about all the possible alternatives or adaptations that had been on the table during the planning process. Regardless, as they were posed with an alternative suggestion of boulevardization in Keilaniemi, it can quite safely be noted that the city boulevard option for instance was at no point seriously considered.

In the end, there is a natural limitation of how much and what kind of research material a researcher can collect within the limits of a master's thesis, which applies studying the plan in Keilaniemi. On the other hand, there has been in place here triangulation based on empirical material, where the document and interview analyses support each other. It is believed here that the expert interviews provided the most central insights and reflected the essential tensions that were in place in the Keilaniemi planning case. As such, it is hard to conceive other possible study objects than the already mentioned. Venturing outside these themes would perhaps require using statistical data and for example geographic information systems.

The collected thematic interview data would have permitted only a certain amount of analytical frames. A certain topic not covered here is the citizen involvement and hearing in planning. The Keilaniemi case offered some references towards this aspect as well, although the citizen involvement as a subject stayed almost entirely implicit. Espoo city planners made planning adjustments especially to the planning area and the exact place of the road because of complaints from the Tapiola Itäranta residents. Perhaps the biggest consequence of anticipating the reactions of people in the area, though, is what is not planned at all: commenting on the boulevard alternative many experts noted that it might be impossible to introduce new development on the western side of Karhusaarentie because of opposition from the residents.

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Appendix 1

THEMATIC INTERVIEWS

Expert A. Transportation planner at City of Espoo. 8.4.2015.

Expert B. Project manager at City of Espoo. 16.4.2015.

Expert C. Transportation manager at City of Helsinki Planning Office. 15.4.2015.

Expert D. Architect at A-Konsultit Architects. 9.4.2015.

Expert E. Representative of Espoo Planning Board. 8.4.2015.

Expert F. Representative of Espoo Planning Board. 16.5.2015.

Expert G. Project manager at Ramboll Finland Oy. 22.5.2015.

Expert H. Project manager at City of Espoo. 4.5.2015.

Expert J. Architect at SARC Architects. 5.5.2015.

Expert K. Executive at SRV Construction. 21.5.2015.

Expert L. Executive at Finnish Transport Agency. 23.6.2015.

Expert M. Transportation planning manager at Uusimaa Centre for Economic Development, Transport and the Environment. 13.5.2015.

Expert N. Architect at City of Espoo. 1.4.2015.

Some key figures of the transcribed interviews, in a randomized order:

	length (min, sec)	pages	words
1	67:15	18	9873
2	72:00	18	9534
3	70:39	17	9312
4	69:12	15	7805
5	82:02	25	13106
6	66:09	14	6279
7	63:23	18	8520
8	56:09	17	7510
9	78:16	20	9311
10	103:00	27	14067
11	61:55	14	7282
12	72:26	18	9548
13	70:12	21	9499
average	71:47,51	18,62	9357,39
median	70:12	18	9312

Appendix 2

THEMATIC INTERVIEW QUESTIONS – CASE KEILANIEMI (in interviews originally in Finnish)

- A traffic tunnel and four residential towers are planned to be built in Keilaniemi. What do you make of the plan?
- What is your own or your organization's relation to the plan?
- In your opinion what is the biggest obstacle for implementing the plan?
- What is what are the pros and the cons of the project?
- What is your assessment of the transportation plan? What things were necessitated when the transport system was developed for the tunnel and towers plan?
- How do different transportation modes play out in relation to each other?
- How well do you think walking and cycling have been taken into account when making the detailed plan in Keilaniemi?
- What is your opinion on the plan of making the incoming motorways in Helsinki into city boulevards?
- It has been suggested that the Karhusaarentie street should be turned into a street. What do you think of this alternative proposition of making the Ring Road I in Keilaniemi a street and building next to it?
- How should transportation planning and city planning be developed in your view?
- During your professional career, has the transportation and city planning changed in some ways?
- What are the biggest questions in transportation and city planning at the moment?

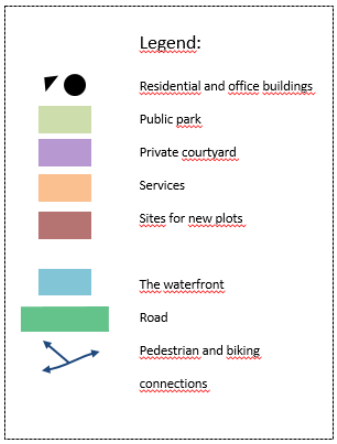
Appendix 3

BUILDING VOLUMES COMPARISON BETWEEN THE TUNNEL AND THE DECK, AND THE LAMUELA ORTA BOULEVARD ALTERNATIVES

The Karhusaarentie street with a deck

Permitted building volume in the area

90 400 floor m²



The original picture. Keilaniemen lähiympäristö- ja korttelisuunnitelma (2011, 31). SRV, Maisema-arkkitehdit Byman & Ruokonen Oy & Arkkitehtitoimisto SARC Oy.

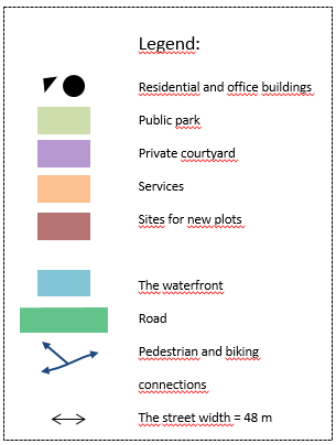
Sources. **Private courtyard**: Keilaniemen lähiympäristö- ja korttelisuunnitelma. **The service and waterfront areas**: Hyvinvoiva Keilaniemi – visio tulevaisuuden kaupunkikeitaasta (2012). SRV & Arkkitehtitoimisto SARC Oy. **Permitted building volume; the width of Karhusaarentie; pedestrian and bicycle connections; locations of the towers and the new plots**: Lamuela Orta, Carlos (2010): From Länsiväylä to Länsibulevardi. Transformation of a Highway into an Urban Boulevard in Helsinki. Diplomityö, arkkitehtuurin laitos, Aalto-yliopisto.

The Karhusaarentie street without a deck

Permitted building volume in the area 80 900 floor-m²

+ 182 000 floor m² (office) and 110 000 floor m² (residential)

= **372 900 floor m²**



The original picture. Keilaniemen lähiympäristö- ja korttelisuunnitelma (2011, 31). SRV, Maisema-arkkitehdit Byman & Ruokonen Oy & Arkkitehtitoimisto SARC Oy.

Sources. **Private courtyard**: Keilaniemen lähiympäristö- ja korttelisuunnitelma. **The service and waterfront areas**: Hyvinvoiva Keilaniemi – visio tulevaisuuden kaupunkikeitaasta (2012). SRV & Arkkitehtitoimisto SARC Oy. **Permitted building volume; the width of Karhusaarentie; pedestrian and bicycle connections; locations of the towers and the new plots**: Lamuela Orta, Carlos (2010): From Länsiväylä to Länsibulevardi. Transformation of a Highway into an Urban Boulevard in Helsinki. Diplomityö, arkkitehtuurin laitos, Aalto-yliopisto.